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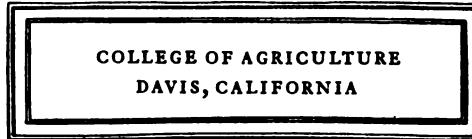
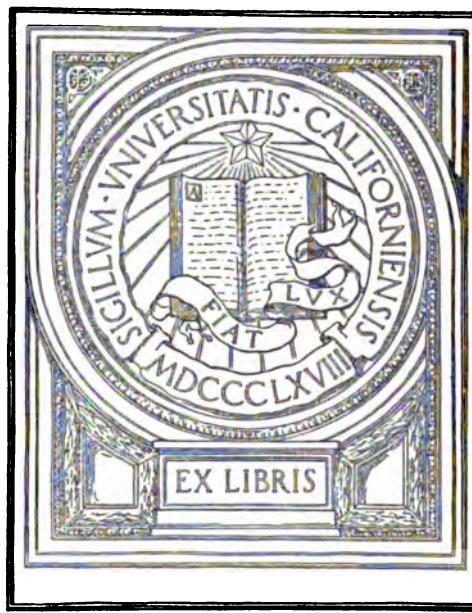
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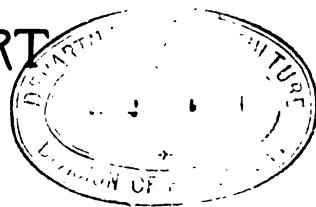


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ANNUAL REPORT

OF THE



Minnesota State Horticultural Society

FOR THE YEAR 1891,

EMBRACING THE

TRANSACTIONS OF THE SOCIETY FROM MARCH 31ST, 1890 TO MARCH 31ST,
1891, ESSAYS, REPORTS, ETC., INCLUDING THE PROCEEDINGS
OF THE ANNUAL MEETING OF THE MINNESOTA
BEE-KEEPERS' ASSOCIATION.

VOL. XIX.



PREPARED BY THE SECRETARY,
A. W. LATHAM, EXCELSIOR, MINN.

MINNEAPOLIS:
HARRISON & SMITH, PRINTERS.
1891.

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A.W. McKinstry

FARIBAULT, MINN.,
SECOND PRESIDENT OF THE MINNESOTA STATE HORTICULTURAL SOCIETY.

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LETTER OF TRANSMITTAL TO THE GOVERNOR.

OFFICE OF THE SECRETARY
OF THE MINNESOTA STATE HORTICULTURAL SOCIETY. }

EXCELSIOR, MINN., March 31, 1891.

To Hon. Wm. R. Merriam, Governor of Minnesota:

SIR.—In compliance with the requirements of the law, I have the honor to submit herewith the annual report of our society for the year 1891.

Respectfully Yours,

A. W. LATHAM,
Secretary.

COMMUNICATION FROM THE SECRETARY.

EXCELSIOR, MINN., March 31, 1891.

Members of the Minnesota State Horticultural Society:

With the sanction of the executive committee, I have decided to adopt a new plan in the arrangement of the material contained in this annual report. The change consists in classifying, under appropriate topics or heads, the various essays, reports, communications, etc., which are embodied in the report.

In previous reports articles have been published in the order in which they were presented at the annual meeting, but in this volume the titles of the articles and names of the writers only are given in the regular order, and the articles themselves and any discussion following have been cut out and arranged together further on, under suitable heads.

A perfect classification under such a plan is, of course, impossible, but I trust it will be found approximately correct.

The greater part of the information contained in this report on each branch of horticulture will be found grouped together under that head. This will save the reader the trouble of running through the entire volume to sift out the matter pertaining to any particular subject.

I hope this may be found a convenient arrangement and meet your approval.

Yours Fraternally,
A. W. LATHAM,
Secretary.

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DEWAIN COOK.....Windom.
L. R. MOYER.....Montevideo.
M. PEARCE.....Chowen
J. O. BARRETT.....Browns Valley.

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REPORT OF THE

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MRS. IDA C. SEWALL.....	St. Anthony Park.

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C. A. SMITH.....	Minneapolis.

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J. G. BASS.....	Hamline.
S. H. KENNEY.....	Morristown.
C. F. Miller.....	Faribault.

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MRS. G. W. SHUMAN.....	Minneapolis.

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MRS. A. BONNIWELL.....	Hutchinson.

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BARNETT TAYLOR.....	Forestville.

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BURTON L. WILCOX	Hastings.

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WM. SOMERVILLE.....	Viola.
E. H. S. DARTT	Watertown.

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L. H. WILCOX.....	Hastings.
F. G. GOULD.....	Excelsior.

MEMBERS.

Allyn, Joshua, 1891	Red Wing.
Andrews, J. P., 1891.....	Faribault.
Barge, Jacob, 1891	Minneapolis.
Bost, A. A., 1891.....	Excelsior.
Bardwell, E. S., 1890.....	Excelsior.
Barrett J. O., 1891.....	Browns Valley.
Buck, Hon. Dan'l, 1891.....	Mankato.
Bohanon, S. L., 1890.....	No. 778 27th Ave. N. E., Minneapolis.
Bonniwell, Mrs. Anne, 1891	Hutchinson.
Brand, Archie M., 1890.....	Faribault.
Burnett Frank, 1890.....	Glenboro, Man.
Brown, C. F., 1891.....	St. Peter.
Bailey, J. E., 1890.....	418 S. E. 4th St., Minneapolis.
Bunnell, M. C., 1891.....	Newport.
Busch, Fred., 1891.....	Richfield.
Beardsley, B. F. 1891.....	Excelsior.
Baston, J. J., 1891.....	St. Louis Park.
Brown, F. S., 1891.....	Tracy.
Brackett, A. H., 1891.....	Minneapolis.
Bass, J. G., 1891.....	Hamline.
Bentley, A. C., 1891.....	808 S. 1st St., Stillwater.
Buckendorf, Henry, 1891.....	Minneapolis.
Cook, M. W., 1891.....	Rochester.
Carlson, Frank, 1890.....	Minneapolis.
Cook, Dewain, 1891.....	Windom.
Crane, H. L., 1890.....	Excelsior.
Cutler, Milon, 1891.....	Sumter.
Cuzner, E. A., 1891.....	214 State St. S. E., Minneapolis.
Crosby, F. M., 1890.....	Hastings.
Clutton, C., 1891.....	Watertown, S. D.
Crandall, Ethan, 1891.....	Sumter.
Cross, Mrs. E., 1891.....	Sauk Rapids.
Clay, O. G., 1890.....	St. Paul.
Callar, E. L., 1891.....	Vermillion, S. D.
Chandler, G., 1891.....	Box 426, Minneapolis.
Crooker, E. B., 1891.....	2212, 6½ Av. S., Minneapolis.
Crooker, Mrs. E. B., 1891.....	" "
Cummings, J. R., 1891.....	Eden Prairie.
Cutts, E. J., 1891.....	Howard Lake.
Caswell, A. M., 1891.....	Litchfield.
Danforth, Wm., 1891	Red Wing.
Dayton, J. F., 1890.....	Waukon, Ia.
Dennis, A. B., 1890.....	Cedar Rapids, Ia.
Dick, Francis, 1891.....	Afton.
Doughty, J. Cole, 1890.....	Lake City.
Deletiaz, G. F., 1891.....	Fort Benton, Mont.
Day, Ernest, 1890.....	Richfield.
Duffus, Wm., 1890.....	Lake City.
Day, L. E., 1891.....	Farmington.
Dobson, Wm., 1891.....	Minnetonka Mills.

Edwards, J. N., 1890....	Ft. Atkinson, Wis.
Fiedler, F. H., 1891.....	Fergus Falls.
Fuller, G. W., 1891	Litchfield.
Folsom, S. H., 1890.....	Minneapolis.
Frisselle, Dr. M. M., 1891.....	Excelsior.
Furber, J. T., 1891.....	Madelia.
Featherstone, J. S., 1891.....	Hastings.
Ferguson, J. A., 1891.....	22 3d St. S., Minneapolis.
Fleckten, J. E., 1890.....	Kandiyohi.
Gould, Mrs. F. G., 1890.....	Excelsior.
Gray, J. S., 1890.....	Minneapolis.
Gilmore, J. F., 1891.....	Richfield.
Green, S. B., 1891.....	St. Anthony Park.
Gordon, C. W., 1891.....	Long Lake.
Gustafson, Chas., 1891.....	Worthington.
Gilbert, F. A., 1890.....	Beardsley.
Green, Mrs. S. B., 1890.....	St. Anthony Park.
Gilliland, C. O., 1890.....	Morgan.
Howe, C. R., 1891.....	Brooklyn Centre.
Harris, E. E., 1891.....	La Crescent.
Harris, F. I., 1891.....	La Crescent.
Harris H. C., 1891.....	414 3d Av. N. Minneapolis.
Hillman, Uno H., 1890.....	Forrestdale, Mass.
Holmes, G. W., 1891.....	Glencoe.
Hillman, S. D., 1891.....	Minneapolis.
Hendrickson, W. G., 1891.....	Hamline.
Heideman, Hon. C. W. H., 1891.....	New Ulm.
Hall, Prof. C. W., 1891.....	Minneapolis.
Hooverstadt, T. A., 1890.....	Holden.
Hagen, O. J., 1891.....	Hendrum, Norman Co.
Hays, Prof. W. N., 1891.....	St. Anthony Park.
Hurt, O. I., 1891.....	Hursfield, Island Lake, Lyon Co.
Hawkinson, Chas., 1891.....	Box 495, Minneapolis.
Ince, J. C., 1891.....	Maple Glen.
Jessup, G. H., 1891.....	Tracy.
Jehness, B. F., 1891.....	Willmar.
Kilbourne, F. M., 1891.....	Lakeville, Dakota Co.
Kennedy, Mrs. A. A., 1891.....	Hutchinson.
Keel, R. C., 1891.....	Rochester.
Kenney, S. H., 1891.....	Morriston.
Kilgore, W. W., 1891.....	Marshall.
Knapheide, J., 1890.....	St. Paul.
Kramer, J. C., 1891.....	La Crescent.
Longsdorf, Wm. H., 1891.....	Lake City.
Lory, H. A., 1891.....	Maple Ridge, Isanti Co.
Lauck, J. B., 1890.....	4th and Townsend Sts. San Francisco, Cal.
Little, John, 1890.....	Granton, Ont.
Levens, C. W., 1891.....	Albert Lea.
Lundberg, C. A., 1890.....	Worthington.
Lyons, Wm., 1891.....	2924 Clinton Av. Minneapolis.
Long, A. G., 1891.....	Excelsior.

Lee, Gunder J., 1890.....	Chippewa Falls, Wis.
Lundwall, Nelson, 1890.....	Bozeman, Mont.
Lugger, Prof. Otto, 1890.....	St. Anthony Park.
Lupton, R. P., 1891.....	Excelsior.
Levensconte, John, 1890.....	St. Anthony Park.
Lord, O. M., 1891.....	Minnesota City.
Myers, D. E., 1891.....	St. Cloud.
Mackintosh, Wm., 1891.....	Langdon.
Mackintosh, R. S., 1891.....	Langdon.
May, L. L., 1891.....	St. Paul.
Maynard, M. M., 1890.....	Excelsior.
Mendenhall, H. W., 1891.....	Rapidan
Miller, C. F., 1890.....	Faribault.
Mills, F. B., 1891.....	1820 Nicollet Av. Minneapolis.
Mills, L. D., 1891.....	Garden City.
Morris, W. H., 1891.....	Excelsior.
Moyer, L. R., 1891.....	Montevideo.
Murray, J. W., 1891.....	Excelsior.
MacMillan, Prof. Conrad, 1890.....	Minneapolis.
Merrill, D. D., 1891.....	St. Paul.
Malmquist, Gust, 1891.....	Minneapolis.
Miner, J. E., 1890.....	Minneapolis.
Nagel, E., 1891.....	1118 W. Lake St., Minneapolis.
Norswing, K. B., 1890.....	Holden.
Nordquist, O. A., 1891.....	Oakland Cemetery, St. Paul.
Olson, Peter M., 1891.....	Bratsberg.
Oestland, Prof. O. W., 1890.....	Minneapolis.
Partridge, Sam, 1891.....	Hamline.
Phelps, E. J., 1890.....	Minneapolis.
Pendergast, Prof. W. W., 1891.....	St. Anthony Park.
Perkins, Dr. E. R., 1890.....	Excelsior.
Pond, E. R., 1891.....	Bloomington.
Perkins, F. L., 1890.....	Excelsior.
Perkins, W. E., 1890.....	Excelsior.
Parker, W. S., 1891.....	Farmington.
Piersons, C. O., 1891.....	Lester.
Puffer, Dr. F. L., 1890.....	Bird Island.
Pennell, Prof. C. S., 1891.....	St. Anthony Park.
Powell, F. M., 1891.....	Glenwood, Ia.
Powell, M. E., 1891.....	St. Peter.
Roe, A. D., 1891.....	Stillwater.
Rogers, Dr. A. C., 1891.....	Faribault.
Smith, C. A., 1891.....	77 S. 7th St., Minneapolis.
Sampson, C. W., 1891.....	Excelsior.
Sampson, J. A., 1890.....	Excelsior.
Sargent, C. A., 1891.....	Red Wing.
Scott, Wm. G., 1891.....	Winnipeg, Man.
Sunderberg, C. A., 1891.....	Worthington.
Smith, James, 1890.....	Brookings, S. D.
Seamens, Wm. D., 1891.....	Viola.
Somerville, Wm., 1891.....	Viola.

Strandwold, Ole, 1891.....	Trysil, N. D
Sharp, L. N., 1891.....	27 S. 4th St., Minneapolis.
Swanson, A. S., 1890.....	St. Paul.
Somerville, L. E., 1891.....	Viola.
Stager, Mrs. Jennie, 1890.....	Sauk Rapids.
Sewall, Mrs. Margaret L., 1890.....	St. Paul.
Sewall, Mrs. Ida C., 1891.....	St. Anthony Park.
Solem, Rev. O. A. Th., 1891.....	Halstad, Norman Co.
Sanders, J. J., 1890.....	Appleton.
Sandsten, Emil, 1890.....	St. Anthony Park.
Sprague, Mrs. D. W., 1891.....	1116 Hawthorne Av., Minneapolis.
Street, A. H. 1891.....	Alden.
Schmauss, F. J., 1891.....	Lake City.
Turner, John, 1891.....	Shakopee.
Tibbetts, M. L., (Rev.) 1891.....	Dover.
Taylor, Jas., 1890.....	Slayton.
Terry, Alfred, 1891 and '92.....	Slayton.
Thorndyke, David, 1890.....	Slayton.
Thompson, John, 1890.....	St. Anthony Park.
Taylor, Barnett, 1891.....	Forestville.
Taylor, Jewell, 1891.....	Forestville.
Tofting, J. J., 1890.....	Tracy.
Todd, Irving, 1890.....	Hastings.
Taylor, Jos., 1891.....	Fairview and Lincoln Ave., St. Paul.
Thayer, M. A., 1891.....	Sparta, Wis.
Thayer, Mrs. P. A., 1891.....	Sauk Rapids.
Trenham, N. J., 1891.....	Alexandria.
Tanner, Wm., 1891.....	Cannon Falls.
Underwood, J. M., 1891.....	Lake City.
Underwood, Mrs. Anna B., 1891.....	Lake City.
Urie, Wm., 1891.....	2520 Bryant Av. N., Minneapolis.
Vosberg, C. C., 1890.....	Lake City.
Van Armen, C. C., 1891.....	Owatonna.
Weston, Geo. A., 1891.....	Faribault.
Walton, A. L., 1891.....	Wabasha.
Warner, C. F., 1890,	Excelsior.
Wing, Henry, 1891.....	Aspelund.
Ward, C. W., 1891	Sumter.
White, L. D., 1890.....	Minneapolis.
Wedge, Clarence, 1891	Albert Lea.
Weiland, Theo., 1891.....	Shakopee.
Wilcox, L. H., 1891.....	Hastings.
Wickersheim, W. J., 1891.....	Idlewild, Lincoln Co.
Woehle, B., 1891.....	Iona, Murray Co.
Wachlin, Wm., 1891.....	Faribault.
Zatterstrom, J. F., 1891.....	Spencer Brook, Isanti Co.

HONORARY MEMBERS FOR FIVE YEARS.

J. E. Corbett, elected 1887.....	Farmersburg, Ia.
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Prof. W. H. Ragan, elected 1889.....	Greencastle, Ind.
Mrs. V. H. Campbell, elected 1889.....	Evansville, Wis.
A. J. Philips, elected 1889.....	West Salem, Wis.
Elmer Reeves, elected 1889.....	Waverly, Ia.
Thos. Frankland, elected 1889.....	Stonewall, Man.
C. C. Bell, elected 1889.....	Booneville, Mo.
Frank Burnett, elected 1890.....	Glenboro, Man.
Mrs. Frank Burnett, elected 1890.....	Glenboro, Man.
Edson Gaylord, elected 1891.....	Nora Springs, Ia.
Prof. C. B. Waldron, elected 1891.....	Fargo, N. D.
M. A. Thayer, elected 1891.....	Sparta, Wis.
G. J. Kellogg, elected 1891.....	Janesville, Wis.

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Dr. P. A. Jewell, died May 25, 1878.....	Lake City, Minn.
Hon. L. B. Hodges, died April 14, 1883.....	St. Paul.
Dr. John P. Warder, died July 14, 1883.....	North Bend, Ohio.
D. W. Humphrey, died Oct. 13, 1885.....	Faribault, Minn.
Hon. Marshall P. Wilder, died Dec. 16, 1886.....	Boston, Mass.
Chas. Hoag, died Feb. 1, 1888.....	Minneapolis.
Mrs. Wealthy Gideon, died 1889.....	Excelsior, Minn.
Chas. Gibb, died March 8, 1890.....	Abbotsford, Quebec.
Cotterell, R. L., died April 19, 1891.....	Dover
Budd, Prof. J. L.....	Ames, Ia.
Bowen, Mrs Jas.....	Minneapolis.
Brand, O. F.....	Faribault.
Coleman, Hon. N. J.....	St. Louis, Mo.
Cleveland, H. W. S.....	Minneapolis.
Corp, Sidney.....	Hammond
Dartt, E. H. S.	Owatonna.
Elliot, Wyman.....	Minneapolis
Ford, L. M.....	San Diego, Cal.
Grimes, J. T.....	Minneapolis.
Gideon, P. M.....	Excelsior.
Gibbs, Jr., Oliver.....	Ramsey, S. D.
Gould, F. G.....	Excelsior.
Harris, J. S.....	La Crescent.
Herzog, Philip.....	Chowen.
Lacey, Chas. Y.....	Fort Benton, Mon.
Luedloff, Chas.....	Carver.
Latham, A. W.....	Excelsior.
Manning, J. W.....	Boston, Mass.
Manning, Mrs. J. W.....	Boston, Mass.
Mendenhall, R. J.....	Minneapolis.
Manning, Miss Sara M.....	Lake City.
Peffer, Geo. P.....	Pewaukee, Wis.
Plumb, J. C.....	Milton, Wis.
Phoenix, F. K.....	Delavan, Wis.

Paist, Mrs. Wm.	Hersey.
Pearce, M.	Chowen.
Peterson, Andrew.	Waconia.
Robertson, Col. D. A.	St. Paul.
Smith, J. M.	Green Bay, Wis.
Stevens, Col. J. H.	Minneapolis.
Smith, T. M.	San Diego, Cal.
Sias, A. W.	Pueblo, Cal.
Smith, C. L.	Minneapolis.
Sargeant, Mrs. H. B.	Lake City.
Tuttle, A. C.	Baraboo, Wis.
Tilson, Mrs. Ida E.	West Salem, Wis.
Van Cleve, Mrs. C. O.	Minneapolis.
Wilcox, E.	La Crosse, Wis.

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OF THE
Minnesota State Agricultural Society,
FOR THE YEAR 1891.**

PRESIDENT.

D. M. CLOUGH Minneapolis.

1ST VICE PRESIDENT.

LANE K. STONE St. Paul.

2D VICE PRESIDENT.

LYSANDER COOK Cottage Grove, Minn.

SECRETARY AND GENERAL MANAGER.

W. F. CROSS Red Wing, Minn.

TREASURER.

FRANK J. WILCOX Northfield, Minn.

BOARD OF MANAGERS.

J. F. NORRISH	Hastings, Minn.
CLARK CHAMBERS.....	Owatonna, Minn.
JOHN COOPER.....	St. Cloud, Minn.
C. N. COSGROVE.....	Le Sueur, Minn.
Wm. M. LIGGETT.....	Hamline, Minn.
J. J. FURLONG.....	Austin, Minn.

* * * The management pledge themselves to make, and invite the co-operation of agriculturists, horticulturists, and others to help in making this year's fair the best ever held. Liberal premiums are offered in every department. For any information address the Secretary, Hamline, Minn.

**NURSERYMEN AND FLORISTS WHO ARE MEMBERS OF THE
MINNESOTA STATE HORTICULTURAL SOCIETY.**

NURSERYMEN.

J. O. Barrett.....	Browns Valley.
O. F. Brand.....	Faribault.
M. C. Bunnell.....	Newport.
P. M. Gideon.....	Excelsior.
J. S. Harris & Son (small fruits).....	La Crescent.
J. M. Underwood (Jewell Nursery Co.).....	Lake City.
A. W. Latham.....	Excelsior.
M. Pearce	Chowen.
Geo. P. Peffer.....	Pewaukee, Wis.
M. L. Tibbetts.....	Dover.
C. L. Smith.....	Minneapolis.
A. C. Tuttle.....	Baraboo, Wis.
A. A. Bost.....	Excelsior.
J. C. Kramer.....	La Crescent.
F. M. Kilbourne.....	Lakeville, Dakota Co.
M. W. Cook (small fruits).....	Rochester.
Wm. Tanner (Tanner & Seager).....	Cannon Falls.
Chas. Hawkinson.....	Box 495, Minneapolis.
E. J. Cutts.....	Howard Lake.
Clarence Wedge.....	Albert Lea.

FLORISTS.

F. G. Gould.....	Excelsior.
R. J. Mendenhall.....	18th St. and 1st Av. S., Minneapolis.
Gust. Malmquist.....	Fair Oaks, Minneapolis.
E. Nagel, (E. Nagel & Co).....	1118 West Lake St., Minneapolis.
Win. Wachlin.....	Faribault.
C. A. Smith, (Smith Floral Co).....	77 S. 7th St., Minneapolis.
C. R. Howe.....	Brooklyn Center.
Jos. Taylor.....	Fairview and Lincoln Ave., St. Paul.
A. M. Caswell.....	Litchfield.
L. L. May, (L. L. May & Co).....	St. Paul.
M. E. Powell.....	St. Peter.
Chas. Bennett.....	35 W. 4th St., St. Paul.
A. C. Bentley.....	Stillwater.
Henry Buckendorf.....	Minneapolis.
A. D. Roe.....	Stillwater.
O. A. Nordquist.....	Oakland Cemetery, St. Paul.

CONSTITUTION
OF THE
MINNESOTA STATE HORTICULTURAL SOCIETY.

ARTICLE I.

NAME.

This society shall be known as the Minnesota State Horticultural Society.

ARTICLE II.

OBJECT OF THE SOCIETY.

The object of this society shall be to improve the condition of pomology, horticulture and arboriculture, by collecting and disseminating correct information concerning the culture of such fruits, flowers, trees and other productions in horticulture as are adapted to the soil and climate of Minnesota.

ARTICLE III.

MEMBERSHIP.

Any person may become a member by paying to the secretary or treasurer an annual fee of one dollar, or a life member by the payment of ten dollars, provided that life members may pay the fee of ten dollars in two equal annual payments of five dollars each.

Local or county horticultural societies and kindred organizations may become auxiliary to this society by sending three delegates to the annual winter meeting, who shall be entitled to all the rights and privileges of membership upon furnishing to the secretary of this society a list of members of their society and a report of the proceedings thereof.

Honorary members, for a time stated or for life, may be elected at any annual meeting by a two-thirds vote of the Society.

ARTICLE IV.

OFFICERS.

Its officers shall consist of a president and one vice president from each congressional district, a secretary, a treasurer, and an executive committee of five, and a librarian.

ARTICLE V.

DUTIES OF PRESIDENT AND VICE-PRESIDENTS.

The president shall preside at and conduct all meetings of the society, and deliver an annual address, and in his absence the vice-presidents, in their order, shall perform the same duties. They shall also have a general supervision of the horticultural interests in their respective districts, and make a written report to the society at its annual winter meeting; in consideration of which the society shall pay their traveling expenses to the same.

ARTICLE VI.

THE SECRETARY.

The secretary shall record all the doings of the society, collate and prepare all communications, etc., for the public press, and pay over all moneys received from members or otherwise to the treasurer on his receipt; receive and answer all communications addressed to the secretary, establish and maintain correspondence with all local, country, district and state horticultural societies, and secure by exchange their transactions, as far as possible; aid the president as an executive officer in the dispatch of business relating to the meetings of the society, take notice of horticultural and similar meetings of general interest, and report to the annual meeting of the society an abstract of the matter that has come into his possession, which, with its approval, shall become part of its transactions of the current year.

ARTICLE VII.

THE TREASURER.

The treasurer shall collect and hold all funds of the society, and pay out the same only on the order of the president, countersigned by the secretary. He shall make up a report of all the receipts and disbursements of the society and present the same at the annual winter meeting, or at any other time when

called upon to do so by the executive committee. He shall give bonds in such sums as the society may direct, to be approved by the president and secretary, and the bond when so approved shall be filed with the state auditor.

ARTICLE VIII.

ELECTION OF OFFICERS.

The officers shall be elected separately and annually by ballot and hold their offices until their successors are elected

ARTICLE IX.

MEETINGS OF THE SOCIETY.

The society shall hold annual sessions on the third Tuesday of January, and other meetings at such time and place as the society may direct.

ARTICLE X.

THE LIBRARIAN.

The librarian shall have charge of the library and report its condition at each annual meeting.

ARTICLE XI

AMENDMENTS.

By-laws and alterations of the constitution for the purpose of meeting the future wants of the society, may be enacted by a vote of two-thirds of the members present at any regular annual meeting, and on one day's notice of the same being given.

BY-LAWS.

1. The president, at each annual meeting of the society shall appoint a general fruit committee, consisting of two members from each congressional district in the state, and it shall be the duty of each member to make a written report annually upon the fruit crop, and a limited list of fruits best adapted for general cultivation in their respective districts.
2. The president, secretary and treasurer shall be members *ex-officio* of the executive committee, who shall have charge of all matters pertaining to the interest of the society.
3. The executive committee may call a meeting of the society at any time they may deem advisable, giving at least thirty days' notice through the public press.
4. The executive committee shall appoint a committee on seedlings, on nomenclature, on forestry, on fruit blossoms, on Russian apples, on gardening, on small fruits and on floriculture.
5. The five members of the executive committee, not including the president, secretary or treasurer, shall be a committee on finance, and it shall be their duty to audit all bills before they shall be ordered paid by the president and secretary.
6. The executive committee shall see that a program is issued for each meeting of the society, at least one month before the winter meeting and ten days before the summer meeting.
7. Every member shall be entitled to one copy of the transactions as often as published, on which postage shall be paid; but in distribution of all other copies the party receiving the same shall pay the postage. Where several copies are sent to auxiliary societies it shall be discretionary with the secretary to pay the freight.
8. *Quorum.*—A quorum shall consist of nine members of the society, or a majority of the executive committee.

RECORD OF THE MEETINGS OF THE EXECUTIVE COMMITTEE FOR THE YEAR ENDING JAN. 22, 1891.

Record of meeting held at Excelsior at noon, Jan. 25, 1890.

Committee called to order by A. W. Latham, chairman; the other members present being President Wyman Elliot, L. H. Wilcox, J. L. Harris, and M. Cutler.

A motion was made and seconded, that a list of the nurserymen and florists connected with the society be put in the forthcoming annual report. Carried.

The following action was taken on the matter of a revision of the premium list. On motion of Mr. Cutler, the president and secretary and the chairman of the executive committee of the Horticultural Society, together with the president of the Bee-keepers Association, were appointed a committee to revise the premium list, in the horticultural department of the State Agricultural Society.

Pres. Wyman Elliot moved that the secretary be and is hereby instructed to get out the annual report as soon as April first, if practicable. Carried.

Mr. Cutler moved that Mrs. A. A. Kennedy be allowed a premium of \$2.00 on her display of sorghum syrup at the winter meeting, 1890. Carried.

Mr. Wilcox moved that the portrait of some ex-president of the Horticultural Society be inserted in the forthcoming annual report, and that the picture of ex-President Charles Hoag be secured for this purpose if practicable. Carried.

The committee adjourned *sine die*.

SAMUEL B. GREEN, Secretary.

Record of meeting held at office of President Wyman Elliot, March 17, 1890. Meeting was called to order at eleven o'clock by the chairman, A. W. Latham. The members present were as follows: J. M. Underwood, W. Elliot, J. L. Harris, M. Cutler, D. Day, A. W. Latham, and S. B. Green. The first business was the adoption of a fruit list for southern and central Minnesota. As Mr. Probestfield had not reported a fruit list for northern Minnesota, the secretary was notified to instruct him of his appointment and get a list from him to go in the report.

It was decided that the secretary ought to notify each appointee on a committee of his appointment and at the same time specify the work desired or expected of such appointee.

O. F. Brand's report as member of committee of exploration of fruits and flowers was accepted and his bill in connection therewith was ordered paid. O. F. Brand's report as delegate to the Wisconsin society's winter meeting was accepted and his bill for traveling expenses was ordered paid. It was moved and carried that the secretary be paid his six months' salary April 1st. This was done because of the stenographer's bill being then due and being more than one quarter's salary. Mr. Harris submitted a report on "Apples that have been or are now grown in Minnesota." This was amended so that in the table the hardiness of the fruit for southern and central Minnesota should be given, and was ordered published as amended. It was decided that a membership in the Bee-keepers Association did not entitle the payer to any rights or privileges in the Horticultural Society, and members of the Bee-keepers Association will not receive a report of the meeting unless they become members of the M. S. H. S.

A list of committees were made up to go in the next annual report.

It was decided to hold the summer meeting at the Experiment Station at St. Anthony Park, the time to be determined by the president and secretary. President Elliot and J.T. Grimes were appointed a committee to obtain the \$500 that the state was in arrears to the society.

Action on Dr. M.M. Frisselle's resolution in regard to offering prizes was postponed on account of lack of funds.

The secretary was instructed to use his judgment as to publishing Mr. O. Gibbs' paper. The committee then adjourned to meet at the summer meeting.

S. B. GREEN, Secretary.

Record of meeting held at Experimental Station June 26, 1890. All members of the committee were present.

An order to the amount of \$65, was passed, with which to pay premiums awarded at summer meeting.

Committee adjourned *sine die*.

S. B. GREEN, Secretary.

Record of the meeting held in Horticultural Hall, September 12, 1890. State fair grounds. Meeting called to order by the chairman, A. W. Latham, besides whom there was present Messrs. Elliot, Harris, Wilcox, Day and the secretary.

The following business was transacted:

Voted to allow the secretary to expend \$100 upon postage for the reports.

Mr. Wilcox and the secretary were appointed a committee to inquire into the matter of the payment of the stenographer.

The following bills were presented for expenses incident to the last executive committee meeting:

Mr. Harris, \$7.20; Mr. Wilcox, \$2.10.

Moved and carried that the next annual meeting of the Society be held in Minneapolis.

Moved and carried that the Messrs. Elliot, Green, Harris, Latham and Wilcox be and are constituted a committee on program for the next annual meeting.

Meeting adjourned *sine die*.

S. B. GREEN, Secretary.

Record of meeting held Nov. 13, 1890, at office of President Elliot, corner Nicollet avenue and Fifth street, Minneapolis.

Messrs. Latham, Elliot, Wilcox, Cutler, Day, Harris and the secretary present. Meeting called to order by the chairman. President Elliott acted as secretary until secretary arrived.

The matter of working up a diploma to be awarded as a premium upon certain exhibits was left in the hands of the chairman of the committee. It was decided that in planning the January meeting that the bee-keepers should meet with the society and farther, that the time allotted to their business meeting should not encroach upon the time of the whole session. It was decided to announce that they should hold their business meeting in a separate room from 9 a. m. to 12 p. m., Wednesday. Also to occupy Wednesday afternoon and evening of general session. Delegates appointed were as follows: O. F. Brands, delegate to Iowa provided he pay his own expenses; he to have credentials from the Society. President Elliot was authorized to appoint a delegate if he declines. Delegate to North Dakota, J. L. Harris, provided he can get free transportation. Delegate to Wisconsin, L. H. Wilcox. Adjourned for dinner.

Meeting called to order at 3 p. m. The matter of securing legislation in aid of an exhibit to be made at the exposition in 1893 was considered. Upon motion it was decided that \$20,000 should be asked for from the legislature the coming winter for the purpose of making an exhibit of the horticultural products of the state, to include fruits, flowers, vegetables and shrubs. Messrs. Latham, Elliot and Grines were appointed a special committee to push this legislation. Moved and

adopted that the program for the coming winter meeting be made out by topics, as last year.

Moved and adopted that all ladies who are invited to read papers shall have their expenses paid to and from the meeting, and also hotel bills, if any.

Meeting adjourned *sine die*.

SAMUEL B. GREEN, Secretary.

Report of Summer Meeting.

(NOTICE.)

MINNESOTA STATE HORTICULTURAL SOCIETY.

SUMMER MEETING TO BE HELD AT ST. ANTHONY PARK, MINNESOTA,
AT THE STATE CENTRAL EXPERIMENT STATION, JUNE 28, 1890.—EX-
CURSION.

Arrangements are being made by the local committee for an excursion on Friday, June 27th, when an opportunity will be afforded for visiting some of the greenhouses and vegetable gardens in the vicinity, including a drive upon the beautiful boulevards and parks of Minneapolis. For further particulars address

SAMUEL B. GREEN,

WYMAN ELLIOT,

Secretary, St. Anthony Park.

President, Minneapolis.

PREMIUM LIST.

STRAWBERRIES.

	First Prem.	Second Prem.
Best general collection of not less than five named varieties, one pint each.	\$5.00	\$3.00
Best four varieties, one quart each.	3.00	2.00
Best Minnesota seedling, not before exhibited.	3.00	2.00
Best quart Wilson's Albany.	2.00	1.00
Best quart Countess.	2.00	1.00
Best quart Charles Downing.	2.00	1.00
Best quart Crescent seeding.	2.00	1.00
Largest fruit of any variety.	2.00	1.00

The same premiums will be awarded upon other varieties of merit new or old.

VEGETABLES.

Best collection, not less than six varieties, grown by exhibitor.	\$5.00	\$3.00
Best 3 bunches of asparagus.	1.00	.50
Best 6 beets.	1.00	.50
Best 6 carrots.	1.00	.50
Best 6 onions.	1.00	.50

Best 6 radishes.....	1.00	.50
Best 6 turnips.....	1.00	.50
Best 6 stalks pieplant.....	1.00	.50
Best 6 heads lettuce.....	1.00	.50
Best 3 heads of cabbage.....	1.00	.50
Best 3 heads of cauliflower.....	1.00	.50
Best 4 peck of green peas.....	1.00	.50
Best 4 peck string beans.....	1.00	.50
Best 4 peck new potatoes.....	1.00	.50
Best 6 cucumbers	1.00	.50
Best 6 summer squash.....	1.00	.50

FLOWERS.

Best collection cut flowers	\$5.00	\$3.00
Best collection roses	5.00	3.00
Best floral design.....	5.00	3.00
Best collection pansies.....	3.00	2.00
Best hand bouquet.....	2.00	1.00

RULES.

The awarding committee shall close their labor, and report to the society at twelve o'clock M. They shall have power to recommend special premiums for seedlings, and articles of special merit, fruits, flowers or vegetables, not provided for in the schedule of premiums. *They shall not award premiums to contributions unworthy of exhibition, even if there is no competition.*

Competition shall be open to all, but the annual membership fee of one dollar will be deducted from premiums awarded to persons who are not members of the society.

AWARD OF PREMIUMS AT SUMMER MEETING OF THE STATE HORTICULTURAL SOCIETY.

STRAWBERRIES.

Joshua Allyn, four qts.....	First,	\$3.00
J. G. Bass, Hamline, qt. Crescent.....	First,	2.00
Wm. Lyons—		
General collection.....	First,	5.00
Qt. Countess	First,	2.00
Qt. Crescent	Second,	1.00
Qt. Martha	First,	2.00
Qt. Bubach	Second,	1.00
Qt. Windsor Chief.....	First,	2.00
J. F. Gilmore, Richfield, Bubach.....	First,	2.00

VEGETABLES.

Joshua Allyn, Red Wing—		
Collection of vegetables.....	First,	\$5.00
Six beets.....	First,	1.00
Six onions.....	First,	1.00
Six turnips.....	First,	1.00
Six radishes.....	First,	1.00
Wm. Mackintosh, Langdon, 3 bu. asparagus.....	Second,	.50

Wm. Lyons—			
Three bu. asparagus.....	First,	1.00	
Pie-plant.....	First,	1.00	
R. P. Lupton, Excelsior—			
Collection of vegetables.....	Second,	3.00	
Pie-plant.....	Second,	.50	
Beets.....	Second,	.50	
Turnips.....	Second,	.50	
Lettuce.....	First,	1.00	
<i>Extra Premiums Allowed.</i>			
J. F. Gilmore, Richfield, on collection of gooseberries and currants.....		2.00	
FLOWERS.			
Roger S. Mackintosh, pansies.....	First,	\$3.00	
E. Nagel & Co., Minneapolis, floral design.....	First,	5.00	
Martha Lyons, cut flowers.....	Second,	3.00	
Hand bouquet.....	Second,	1.00	
F. G. Gould, Excelsior—			
Collection of art flowers.....	First,	5.00	
Collection of roses.....	First,	5.00	
Collection of pansies.....	Second,	2.00	
Hand bouquet.....	First,	2.00	
J. G. Bass, Hamline, collection of roses.....	Second,	3.00	

**REPORT OF PROCEEDINGS AT THE SUMMER MEETING
OF STATE HORTICULTURAL SOCIETY HELD AT
STATE EXPERIMENTAL STATION, JUNE 26, '90.**

About twenty-five were present including Prof. J. L. Budd, of Ames, Iowa. There was a fair show of strawberries but the general complaint was that the crop was light, especially on old beds. New beds had fruited more abundantly than old ones.

The exhibit of roses, by F. G. Gould, was exceptionally fine.

The show of vegetables was also very good.

The meeting was called to order by Pres. Elliot, at 1:30, and was first addressed by Prof. Budd, who spoke of his increasing belief in the value of Russian fruits, especially in cherries, and said some of the Russian cherries would grow wherever the sand cherry would. He spoke favorably also of the Russian apple, and said some of them were valuable for low lands, while some were especially adapted to high lands.

Mr. O. C. Gregg, being introduced by the president, made some interesting remarks upon the relation of horticulture to the Farmers' Institute course.

Col. J. H. Stevens next addressed the meeting as follows—
Mr. President, I hardly know what to say when those great

men have preceded me, especially a man with the experience of Prof. Budd, a gentleman who has visited all parts of this country and Europe, and has raised and imported successfully very many plants from distant countries. I must confess unconditionally that it has been different with me, for I have failed in horticulture, while I did make a success in agriculture, though I do not give up.

I am not like my friend Dr. ——, with cherries, peaches and pears; but we can raise *apples* in Minnesota.

Now, in regard to Russian fruits I think, although we have certainly some very nice fruits, if we can get better from Russia, get them. And I only wish I was about twenty years younger I would put my hand to the wheel again, and if we old people take hold of the work and do, by and by the young ones will take hold too.

Dr. Frisselle of Excelsior, being called upon spoke as follows:

Mr. President, gentlemen and ladies: I think that I told you last winter all that I know about currants, and I think it is hardly fair for you to expect me to say anything more. I happen to have a little patch that I should like to show all of you if you would come out and look at them.

I think last year was especially adapted to fruit farms.

I am in hopes, off from one thousand bushes, to get close to one hundred bushels of fruit, which will be good and command a good price in the market. A larger part of it will bring me four dollars a bushel.

Farmers do not give room enough to their plants. I planted mine four feet apart and I find that six or eight is better. A neighbor of mine who has been looking through my patch has planted his eight feet apart.

Why a man can't get through them without trampling them down is because sufficient room is not given, and perhaps another great reason is that they are not properly cared for.

President Elliot: We would like to hear from Mr. Underwood on strawberries.

Mr. J. M. Underwood, Lake City: I will say that my young beds of strawberries passed through the winter very well, the old beds not having done so well, and the dry weather has made them suffer.

The berries are very nice on our young beds—we covered our beds with dry mulch of rye straw.

I have been twenty years trying to find out which is the best variety, and it may be because I have not had as much experience as other folks, but I have made a great many enquiries of men who have had the experience, and when I have asked them this question, "what two varieties would you plant?" they would give me ten or fifteen kinds of berries.

I think for market as far as I have seen them the Crescent is the best; marketmen seem to favor them.

We do not ship any berries, raise them only for our own use.

Now of course I am giving you other people's ideas more than I am my own, but I am satisfied that I am more interested in strawberries now than ever before.

Pres. Elliot spoke about the Busch place and his great profit from forced cucumbers.

Mr. Busch sold last year \$12,000 worth from six acres of land, mostly cucumbers, but some celery and cabbage. He stores his celery in boxes and covers it with salted hay and brings the boxes into the green house two weeks before it is needed. Does not earth up in the field, and plants his celery very late.

Mr. President—I have purposely neglected to call for a speech of welcome from Prof. N. W. McLain until the last.

Prof. McLain:—

Mr. President, ladies and gentlemen: If it is true that a man can make the best speech upon a subject of which he knows the least, I ought to make a good one on horticulture, although I know a good many things about horticulturists.

I was brought up on a farm. I am surprised to hear that there is only one bush in Minnesota, instead I think there should be a good many trees equal to the man just referred to by your president, and when you go away you must make up yours minds that there is not going to be only one bush in Minnesota.

Now then, it is no use for me to try to tell you anything about horticulture, but you are welcome at the state farm and there are many nice things we would like to have you see before you leave.

A motion was made and carried to have a short memorial for the next annual report of Prof. C. Gibbs, a promoter of horticulture.

Meeting then adjourned sine die.

On Friday, Jan. 27, the members of the horticultural society, through the courtesy of the Minneapolis resident members, made the tour of the park system of the city of Minneapolis,

passing a delightful day. Mr. Berry, superintendent of the city parks, Prof. H. W. S. Cleveland and Prof. J. L. Budd accompanied the party. A mid-day stop was made at the Pavilion at Lake Harriet for lunch. In the afternoon the party visited the greenhouses of Mr. Fred Busch in Richfield, and his methods of forcing cucumbers and other early vegetables under glass were examined with great interest.

ANNOUNCEMENT OF ANNUAL MEETING

MINNESOTA STATE HORTICULTURAL SOCIETY—TWENTY-FOURTH ANNUAL MEETING.

The twenty-fourth annual winter meeting of the Minnesota State Horticultural Society will be held in Minneapolis, January 20, 21, 22 and 23, 1891, in Guaranty Loan building.

It is very desirous that there should be a full attendance.

Horticulture is progressing, and the cultivation of the larger fruits in this state has received a fresh impetus from the fact that we have had a large crop of apples the past year while in almost all of the so-called fruit growing districts of the country the crop was a short one or an entire failure.

There will be ample opportunity to ask questions and to have them answered by careful, successful cultivators. The discussion of new varieties and methods of culture will be a special feature. We are expecting several prominent horticulturists from other states. The subject of securing needed legislation to aid in making a proper display of horticultural products at "The World's Columbian Fair" will be considered.

The exhibit of fruit will undoubtedly be larger than at any previous meeting for many years.

All superintendents of experiment stations and members of committees are expected to make reports. This is very important as it is to them that our members look for much of their information.

A cordial invitation is extended to kindred organizations in this and other states, as well as to local societies, to send delegates to the meetings, which are *free* to all. Young people and ladies are cordially invited to come and take part in these meetings.

It is expected that the usual reduction in fares will be obtained from the various railroads of this state. Delegates on

purchasing a full fare ticket going should at the same time secure from the agent a delegate convention receipt specifying that such ticket has been purchased, in order that the same may be properly endorsed for the return trip.

WYMAN ELLIOT,

SAMUEL B. GREEN,

President, Minneapolis.

Secretary, St. Anthony Park.

PROGRAM.

The following order will be subject to change from time to time as the Executive Committee of the Society may deem best.

FIRST DAY—TUESDAY, JANUARY 20th, 10 a. m.

Opening Prayer.

Small Fruit Papers.

Blackberries west of the Big Woods. M. Cutler, Sumter.

Small Fruit in Otter Tail County. F. H. Fiedler, Perham.

Discussion.

Strawberries. George J. Kellogg, Janesville, Wis.

Small Fruit. T. T. Lyon, Grand Haven, Mich.

Report of Committee on Small Fruits. { M. Pearce. Chowen.
Wm. Lyons. Minneapolis.
Dewain Cook. Windom.

Experience in Orcharding. J. Wickershein, Idlewild.

Arrangement of Exhibits and Reception of Members.

AFTERNOON SESSION, 2 p. m.

Wild Fruits of Northern Minnesota. Dr. J. R. Walker, St. Anthony Park.
Discussion.

Forestry. Prof. B. E. Fernow, Washington, D. C.

What are the best Forest Trees for our Northern Prairies. J. O. Barrett, Brown's Valley.

REPORTS FROM LOCAL SOCIETIES.

Southern Minnesota Horticultural Society.

Minnesota Valley Horticultural Society.

Lakeside Horticultural Society.

McLeod County Horticultural Society.

Ramsey County Agricultural and Horticultural Society.

Correspondence. Question Box. Discussion.

EVENING SESSION, 7 p. m.

Music.

Address of Welcome. J. T. Grimes, Minneapolis.

Response to address of Welcome. Clarence Wedge, Albert Lea.

Music.

President's Annual Address. Wyman Elliot, Minneapolis.

The First "Mum" Exhibition, Col. J. H. Stevens, Minneapolis.

Annual Report of Secretary.
Annual Report of Treasurer.
Report of Librarian.
Report of Committee on Library.

SECOND DAY—WEDNESDAY, JANUARY 21st, 9 a. m.

Appointment of Committees. Committees on Fruit List, Award of Premiums, Reports, Publications, Final Resolutions and Obituary.

Orchard Topics.

Protection of Fruit Trees from a farmer's experience. Seth Kenney, Morristown.

Protection of Fruit Trees from the nurseryman's standpoint. O. F. Brand, Faribault.

Future of Orcharding. J. M. Underwood, Lake City.

Fruit Trees and Orcharding. M. Pearce, Chowen.

Discussion.

Report of Committee on Russian Apples. } Wm. Somerville.
A. Peterson. }

Discussion.

Influence of the Stocks on Development of Orchards. Prof. J. L. Budd, Ames, Iowa.

Apple Growing Around Lake Minnetonka, A. W. Latham, Excelsior.

Report of Seedling Fruit Committee. J. S. Harris, La Cresent.

Business meeting of the Beekeepers Association, apart from Horticultural Society, will meet at 9 a. m.

AFTERNOON SESSION.

Devoted to the Beekeepers Association.

President's Address.

Preparing the Apiary for Winter. C. Thielman.

Extracted Honey. E. R. Pond.

Management for Profit. N. P. Aspinwall.

Discussion. Letters. Reports and Question Box.

EVENING SESSION, 7 p. m.

Devoted to the Beekeepers Association.

Honey Plants. A. N. Wilcox.

Hives and Cases. Wm. Dyer.

Address. Prof. N. W. McLain.

Unfinished Business.

THIRD DAY—THURSDAY, JANUARY 22nd, 9 a. m.

Paper on Grapes. George Robinson, Minneapolis.

Paper on Grapes. J. S. Sewall, St. Anthony Park.

Treatment of Fungus Diseases of Grape Vines. A. W. Latham, Excelsior.

Discussion.

Native Plums. C. W. H. Heideman, New Ulm.

Peach Growing in Minnesota. O. H. Modlin, Excelsior.

Report of Finance Committee.

AFTERNOON SESSION, 2 p. m.

District Reports. Alfred Terry, Slayton.
 By Vice-Presidents of the Society. O. F. Brand, Faribault.
 M. Pearce, Chowen.
 J. O. Barrett, Browns Valley.

Annual Election of Officers, by ballot.

Cultivation of Celery. L. H. Wilcox, Hastings.

Cultivation of Vegetables. Wayland Stedman, Rochester.

Subject to be selected. Chas. Leudloff, Carver.

Subject to be selected. Roger Mackintosh, Langdon.

Columbian Exposition. What should this State do for It? Hon. S. M. Emery, Lake City.

EVENING SESSION, 7 p. m

Music.

Geographical Formations as Related to Plant Growth. Prof. C. W. Hall, Minneapolis.

Discussion.

Poem. "Johnnie Appleseed."

Diseases of Fruit. Prof. C. McMillan, Minneapolis.

Insects injurious to Vegetables. Prof. Otto Lugger, St. Anthony Park.

Entomologist's Report. Prof. O. W. Oestlund, Minneapolis.

Report of Committee on Entomology.

Paper on Ornithology. Dr. P. L. Hatch.

FOURTH DAY—FRIDAY, JANUARY 23, 9 a. m.

Award of Premiums.

Elementary Principles of Manuring. Prof. Samuel B. Green, St. Anthony Park.

Relation of Horticulture to Agriculture. Prof. W. N. Hayes, St. Anthony Park.

Horticulture on the Farm. Clarence Wedge, Albert Lea.

AFTERNOON SESSION, 2 p. m.

Reports from Experiment Stations.

NOTE.—All Superintendents of Experiment Stations and members of Committees are urgently requested to make reports.

Prof. Samuel B. Green.....	St. Anthony Park.
E. H. S. Dartt.....	Owatonna.
O. F. Brand.....	Faribault.
G. W. Fuller.....	Litchfield.
F. G. Gould.....	Excelsior.
J. S. Harris....	LaCrescent.
Hon. C. W. H. Heideman	New Ulm.
O. M. Lord.....	Minnesota City.
Charles Leudloff.....	Carver.
M. Pearce.....	Chowen.
Andrew Peterson.....	Waconia.
James Poole.....	Farmington.
R. M. Probstfield.....	Moorhead.
A. W. Sias.....	Rochester.
Underwood & Emery.....	Lake City.
Hon. Fred Von Baumbach.....	Alexandria.

Report of General Fruit Committee:

Sidney Corp.....	Hammond.
D. K. Michenor.....	Etna.
J. C. Kramer.....	La Crescent.
George A. Claggett.....	Montevideo.
M. C. Bunnell.....	Newport.
N. J. Stubbs.....	Long Lake.
Clarence Wedge.....	Albert Lea.
Lucius Mills.....	Garden City.
M. Cutler.....	Sumpter.
L. E. Day.....	Farmington.
W. H. Brimhall.....	Hamline.
J. H. Ludlow.....	Worthington.

Report of Special Committee on Fruit Lists and Revision of Same.

Report of Committee on Nomenclature.

Report of Special Committees.

Report of Committee on Legislation.

Report of Committee on Final Resolutions.

Place of Next Meeting.

Miscellaneous Business.

Final Adjournment.

PREMIUM LIST.

APPLES.

[All plates to consist of five specimens.]

1. Best collection of Minnesota apples, including hybrids, first premium, \$5.00; second, \$3.00; third \$2.00.
2. Best display of Wealthy, one peck, first premium \$5; second \$3.
3. Best plate of Winter apples, any variety, first premium \$2; second, \$1.
4. Best plate Winter varieties Russian apples, first premium \$2; second, \$1.
5. Best new seedling, never before exhibited, first premium \$5; second, \$3; third, \$2. To be accompanied by description of tree, locality, soil and surroundings.
6. Best new, long keeping seedling, hybrid or crab, first premium \$3; second, \$1.

GRAPES.

1. Best display of native grapes in good condition, first premium \$5; second \$3, third, \$2.
2. Best plate, any variety, first premium \$3; second, \$2.
3. Best display of fruit in jars, (not preserves,) first premium \$5; second, \$3.

Best cultivated cranberries, provided a history of their cultivation be furnished, first premium \$5; second, \$3.

PLANTS AND FLOWERS.

1. Best display of ornamental and flowering plants, first premium \$5; second, \$3.
2. Best display of roses in pots, first premium \$2; second \$1.
3. Best display of geraniums, first premium \$2; second. \$1.
4. Best display of single plant in bloom, first premium \$2; second, \$1.
5. Best display of begonias, first premium \$2; second, \$1.
6. Best display of carnations, first premium \$2; second, \$1.

CUT FLOWERS.

1. Best and most artistically arranged design, first premium \$5; second, \$3.
2. Best collection roses, first premium \$3; second, \$2.
3. Best hand bouquet, first premium \$3; second \$2.

VEGETABLES.

Best display, not less than ten sorts, first premium \$5; second, \$3.
Best half peck early potatoes, first premium \$2; second, \$1.
Best half peck potatoes for winter and spring, first premium \$2; second, \$1.
Best half peck onions, first premium \$2; second, \$1.
Best half peck turnips, first premium \$2; second, \$1.
Best half peck beets, first premium \$1, second, 50 cts.
Best half peck parsnips, first premium \$1; second, 50 cts.
Best half peck carrots, first premium \$1, second, 50 cts.
Best Hubbard squash, first premium \$1, second 50 cts.
Best six bunches celery, first premium \$1; second 50 cts.
Best winter cabbage, first premium \$1; second, 50 cts.
Best winter lettuce, first premium \$1; second, 50 cts.

PANTRY STORES—PRODUCT OF 1890.

Best display of canned fruits, \$3; second best \$2.
Best display of jellies, \$2; second best \$1.
Best jar mixed pickles, \$1; second best 50 cts.
Best exhibit home made vinegar, \$1; second best 50 cts.
Best exhibit comb honey, \$3; second best \$2; third best \$1.
Best exhibit extracted honey, \$3; second \$2; third \$1.
Display of garden tools and horticultural implements. Certificate of honorable mention.

Exhibitors are expected to make their entries the first day; all exhibits must be in place by 2 o'clock p. m. of the first day.

Premiums will not be awarded to exhibits that the judges may think unworthy.

Competition is open to all who join the society. The annual fee is \$1 and all members are entitled to bound copies of the report.

**LIST OF PREMIUMS AWARDED AT THE ANNUAL
MEETING OF THE MINNESOTA STATE HORTICUL-
TURAL SOCIETY.**

APPLES.

1st premium, R. C. Keel.....	\$5.00
2nd premium, Wm. Somerville	3.00
3rd premium, J. S. Harris.....	2.00

Best display of Wealthy, one peck.

1st premium, C. W. Gordon.....	5.00
2nd premium, Sidney Corp.....	3.00

Best plate of Winter Apples.

1st premium, R. C. Keel.....	2.00
2nd premium, Wm. Somerville	1.00

Best plate, Winter variety, Russian Apples.

1st. premium, R. C. Keel,.....	2.00
2nd premium, C. W. Gordon,	1.00

Best new variety, never before exhibited.

1st premium, J. S. Harris.....	5.00

Best new long-keeping Seedlings, etc.

1st premium, O. F. Brand.....	3.00
2nd premium, J. S. Harris	1.00

GRAPES, ETC.*Best display of Native Grapes, etc.*

1st premium. A. W. Latham.....	5.00

Best plate of any variety.

1st premium, A. W. Latham	3.00
2nd premium, F. G. Gould.....	2.00

Best display of Fruit in Jars, etc.

1st premium, Wm. Lyon.....	5.00

PLANTS AND FLOWERS.*Best display of Ornamental and Flowering Plants.*

1st premium, R. J. Mendenhall	5.00
2nd premium, E. Nagel & Co.....	3.00

Best display of Roses in Pots.

1st premium, E. Nagel & Co	2.00

Best display of Geraniums.

1st premium, R. J. Mendenhall	2.00
2nd premium, Wessling & Hartmann.....	1.00

Best display of Single Plant in Bloom.

1st premium, R. J. Mendenhall	2.00
2nd premium, E. Nagel & Co.....	1.00

Best display of Begonias.

1st premium, Wessling & Hartmann.....	2.00
2nd premium, E. Nagel & Co	1.00

Best display of Carnations.

1st premium, F. G. Gould	2.00
2nd premium, R. J. Mendenhall.....	1.00

CUT FLOWERS.*Best Floral Design.*

1st premium, E. Nagel & Co.....	5.00
2nd premium, R. J. Mendenhall	3.00

Best collection of Roses.

1st premium, R. J. Mendenhall.....	3.00
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Best hand Bouquet.

1st premium, Wessling & Hartmann.....	3.00
2nd premium, E. Nagel & Co	2.00

VEGETABLE AND PANTRY STORES.*Best Display of Vegetables, not Less than Ten Varieties.*

1st premium, R. P. Lupton.....	\$5.00
2nd premium, J. Allyn.....	3.00

Early Potatoes, one-half peck.

1st premium, Wm. Lyon.....	2.00
2nd premium, J. G. Bass.....	1.00

Winter Potatoes, one-half peck.

1st premium, J. F. Gilmore.....	2.00
2nd premium, R. P. Lupton.....	1.00

Onions, one-half peck.

1st premium, J. G. Bass.....	2.00
2nd premium, Wm. Lyon.....	1.00

Turnips, one-half peck.

1st premium, R. P. Lupton	2.00
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Beets, one-half peck.

1st premium, J. G. Bass.....	1.00
2nd premium, Wm. Lyon.....	.50

Parsnips, one-half peck.

1st premium, J. Allyn.....	1.00
2nd premium, R. P. Lupton50

Carrots, one-half peck.

1st premium, R. P. Lupton.....	1.00
2nd premium, J. Allyn.....	.50

Hubbard Squash.

1st premium, G. Chandler & Sons.....	1.00
2nd premium, J. Allyn.....	.50

Celery, six bunches.

1st premium, J. Allyn.....	1.00
2nd premium, J. S. Featherstone.....	.50

Cabbage, Winter.

1st premium, J. Allyn.....	1.00
2nd premium, J. G. Bass.....	.50

PANTRY STORES, PRODUCT OF 1890.

Display of Canned Fruits.

1st premium, R. P. Lupton	3.00
2nd premium, Mrs. A. Bonniwell.....	2.00

Display of Jellies.

1st premium, Wm. Lyon.....	2.00
2nd premium, Mrs. A. Kennedy	1.00

Jar of Mixed Pickles

1st premium, J. Allyn & Son	1.00
2nd premium, J. S. Featherstone.....	.50

Home-made Vinegar.

1st premium, Wm. Lyon.....	1.00
<i>Comb Honey.</i>	

1st premium, L. H. Wilcox Sons.....	3.00
2nd premium, E. Kimball.....	2.00
3rd premium, J. S. Featherstone.....	1.00

Extracted Honey.

1st premium, J. W. Murray.....	3.00
2nd premium, J. Allyn & Son.....	2.00
3rd premium, L. H. Wilcox Sons.....	1.00

RECORD OF THE TWENTY-FOURTH ANNUAL MEETING
OF THE MINNESOTA STATE HORTICUL-
TURAL SOCIETY,

Held in the Northwestern Guaranty Loan building, Minneapolis, Minn., Tuesday, Wednesday, Thursday and Friday, January 20, 21, 22 and 23, 1891.

FIRST DAY, TUESDAY, JANUARY 20.

MORNING SESSION.

The meeting was called to order at ten o'clock by President Elliot, and Rev. Smith Baker, of the Park Avenue Congregational Church, opened the session with prayer.

President Elliot:—We will begin the program with a paper on Blackberries West of the Big Woods, by M. Cutler, of Sumpter. The following paper was then read by the author: "Blackberries West of the Big Woods," by M. Cutler, Sumter. (*See index.*)

An instructive discussion followed the reading.

The following paper was then read by the secretary: "Small Fruits in Otter Tail County," by F. H. Fiedler, Perham, Minn. (*See index.*)

A discussion followed the reading. The secretary then read the following reports: "Report on Small Fruits," by Dewain Cook, Windom, Minn; and a "Report," by Sidney Corp, Hammon, Minn. (*See index.*)

A discussion succeeded the reading of these reports.

President Elliot:—If you have nothing further to offer on small fruits we will pass on to the paper of Mr. Wickershein.

The secretary then read the following paper: "Fruit Growing in Lincoln County," by J. Wickershein, Idlewild, Minn. (*See index.*)

A short discussion succeeded the reading.

President Elliot:—We will devote the rest of this forenoon to reception of members, arrangement of exhibits, etc., and we will meet again at half past one, sharp.

Adjournment.

AFTERNOON SESSION, TUESDAY, JAN. 20.

President Elliot:—Fellow members, I have the honor of introducing to you Mr. George J. Kellogg, the noted small fruit culturist of Janesville, Wisconsin.

George J. Kellogg:—Mr. President, ladies and gentlemen: As I said to you this morning, I am very happy to meet with you at this annual gathering. I came prepared to almost freeze to death, but one of your members says you are going to grow oranges here; I do not know but what you may; you certainly can grow small fruits.

Mr. Kellogg then read the following paper: "Strawberries," by Geo. J. Kellogg, Janesville, Wis. (*See index.*)

A long and interesting discussion followed the reading of this paper.

President Elliot—Before we pass on to the next topic I would say we have a gentleman here who wishes to say a few words in regard to the regulation of weights and measures in selling fruits and produce, Ald. J. S. Gray.

Ald. J. S. Gray:—A communication came to the city council some two weeks ago from the commission men and from grocers asking that an ordinance be prepared regulating weights and measures. When we came to look up the state law we found this city had no authority in this matter to regulate weights and measures, and we found further that there is no state law. About the only thing it says is this, that if a man sells more than sixty pounds of potatoes for a bushel he shall be fined. (Laughter). Now it occurred to me that this society was a representative body of men from all over the state of Minnesota, and we simply held off a few days until this society met to ask you, if the matter is of sufficient importance, to appoint a committee to work with us in getting up a general law covering this matter that would require certain weights and measures to be used in the sale of fruits and produce.

The city of Minneapolis has become a great shipping point; a great many carloads are sent out every fall, especially potatoes and onions, but if a man puts in a pound more than sixty pounds in a bushel he is prosecuted; if fifty pounds it is all right.

I should like you gentlemen to take the matter up, and if you will appoint a committee to work with us we shall be very glad

to co-operate with you, and if not we shall have to do the work our own way,

M. Pearce:—I move to have a committee appointed to consist of Mr. Elliot, Mr. Dartt and Mr. Grimes.

M. Cutler:—I think we should take this question up and discuss it while we are together. This is a matter of great importance. In the east everything is sold by the pound, whether it is potatoes, turnips or anything else. Apples are sold by the pound, and I presume berries are; in fact, everything is sold by the pound; and this is probably the fairest way in which any kind of produce can be sold. This is especially true in regard to fruit, and I think it is a proper matter for consideration here. On going into our markets here we find a good many different styles of packages and boxes. We find strawberry boxes that do not begin to hold a quart, and yet there is no law to regulate this, and I believe this is a subject in which all of us are interested who raise fruits and vegetables for the market, and I believe while the commission men wish regulation something should be done to regulate the commission men. While there are honorable and upright commission men, yet there is a great deal of trickery practiced, and a large amount of fruit is lost through carelessness in handling. If there was an arrangement made so that fruit shipped in here from other states could be sold previous to its arrival, at auction or otherwise, I believe there would be a great saving. My idea may be wrong, but I believe there would be a great saving made if some such arrangement were carried out.

E. H. S. Dartt:—As I understand this matter there is to be a committee appointed to confer with the city council, and I would suggest as the best plan to appoint a committee from our society who are residents of Minneapolis. They need not confer with the council committee now, but at some future time, and I think in that case our president would be just the man to head that committee.

M. M. Frisselle:—I think this subject is of the utmost importance and needs to be thoroughly discussed. Evidently there is a great injustice done to consumers. The commission man, the wholesaleman and the grocer buy their articles in the market by weight. He buys his potatoes by weight; he does not sell them by weight. He buys a bushel by weight, but when he sells, he sells a bushel and a peck by measure. I think this matter should be carefully discussed by this society. Now I am in favor of sell-

ing eggs by weight. You buy them by the dozen and there is no difference made in the price between large sized eggs and small ones. I have weighed eggs to find what the actual money difference was between one hundred large eggs and one hundred small ones, and the actual difference between large ones and small ones was sixty-five cents when I came to weigh them. This is a damage to the consumer. He does not want to pay two dollars for a dollar and fifty cents worth of eggs; he wants two dollars worth.

President Elliot:—I will say in regard to my being on the committee, I think the proper way for our society to do this is to pass it over to our committee on legislation, and that is the proper place for it to go, and unless there is an objection made we will consider it referred to our committee on legislation.

I do not think there is any necessity for further discussing this question; I think we are all of one mind that something ought to be done, and that pretty soon; the longer it is let run the worse it is getting.

Ald. Gray:—I would like to ask when your committee on legislation makes its report. Our legislative committee meets tonight, and meets again some time during the week.

President Elliot:—I am chairman of that committee, but I cannot meet with it tonight. The other members are Mr. Grimes and Mr. Harris.

J. S. Harris: I do not know whether we have any time to work on this before the society, but there are certain points in legislation that ought to go further back than the state of Minnesota or the city of Minneapolis. Now we in the northwest feed on the fruits of the south a long time before our fruit comes in to the market. The commission men of Chicago send us up large quantities of berries in small packages, and the people buy them and without question and eat them long before our fruit comes in, but when ours does come in they expect us to give them full measure, thirty-two quarts to the bushel and make the bushel run over. It seems to me that the government of the United States ought to make a standard of weights and measures, so that as long as Chicago is the hub of the universe they cannot impose on us at all kinds of odds.

M. Pearce: Now so far as the regulation of fruit packages is concerned, we have established what is called the short weight; it is short measure, it is simply that the packages are filled up without regard to actual measurement, but

the difference is certainly small. Now the difficulty about making any change is this, nearly every fruit grower has got his material on hand and is making or has made his boxes for next year, and I do not think it would be advisable to make any change at present. We never sell by the quart, they are simply boxes. You will not get one cent more for your fruit, and I do not think we can improve on what we have now; we are not cheating anybody, but selling a short quart, and they know it is short. It is often the case that they will often measure as much as full quarts. Not only this, but the factories are cutting their material and I know I have all my material on hand for next season.

Geo. J. Kellogg: I do not know how we can regulate this matter. The machines are all at work cutting their boxes in Michigan and Illinois. We have got to make it a national question. There is another trouble here with our local dealers. They take your twenty-four box crate of berries and set them on the outside of their stores and people come along and pick off a nice berry, and every time a good berry goes off it reduces the quart, and when you get your box home you go for the grower, but never for the grocery dealers or commission men.

E. H. S. Dartt: Now there is another question: Do not grocery men divide the boxes and make them smaller?

President Elliot: We will have to draw this discussion to a close. The next topic on the program is a paper on "Wild Fruits in Northern Minnesota," by Dr. Jas. R. Walker, St. Anthony Park, Minn. (*See index.*)

A discussion on Wild Fruits succeeded.

President Elliot: If there are no other points in the paper that need to be ventilated we will take up the next topic which is a paper on Forestry, by Professor Fernow, of Washington.

The secretary then read the following paper: "Forestry," by Prof. B. E. Fernow, Washington, D. C. (*See index.*)

President Elliot: We have another paper on this subject, I understand, by Mr. Folsom.

S. H. Folsom: It will take about twenty minutes to read my paper. Please excuse me from reading it and I will submit it to the publication committee.

President Elliot: The next subject then is a paper on Forestry in the Northwest, by Mr. Barrett, of Brown's Valley.

Mr. J. O. Barrett then proceeded to read the following paper, entitled: "What Forest Trees are Best Adapted to Our

Northwestern Prairies," by J. O. Barrett, Brown's Valley, Minn. (*See index.*)

President Elliot: Mr. Dartt informs me that he has a short paper here on forest trees. While he is getting ready I want to make an announcement. On our program you will see we have a question box. Now we will have a box here on the table to put them in, and if you will prepare any questions you wish to ask between now and tomorrow morning and place them in this box; they will be disposed of fifteen minutes before twelve o'clock tomorrow morning; that is, we will take them up and go as far as time will permit, and then each session after that we will devote fifteen minutes to the question box.

Mr. Dartt then read the following paper: "Companionship of Trees," by E. H. S. Dratt, Owatonna, Minn. (*See index.*)

A long discussion on forestry ensued.

The meeting then adjourned to 7 o'clock p. m.

EVENING SESSION.

TUESDAY, JAN. 20.

President Elliot: The first thing on our program this evening is music, but we did not succeed in getting any, so we will pass that and now Mr. Grimes will give us the address of welcome.

ADDRESS OF WELCOME.

BY J. L. GRIMES, MINNEAPOLIS.

Ladies and Gentlemen of the Minnesota State Horticultural Society:

It is my pleasant privilege in the name and in behalf of the good people of Minneapolis to extend unto you our cordial greeting, and bid you welcome to all the privileges of our beloved city and the hospitality of its citizens, trusting that we shall be able to make you feel at home while here among us.

Today you meet in convention to represent the horticultural interests of the state at large, and we feel honored by your presence.

We meet as friends; we have met before, and we know the object you have in view, which is to elevate and improve all our moral surroundings and make our homes the most endearing spot on earth, attractive and beautiful, by the planting of trees, fruits and flowers, that our sons and our daughters may be edu-

cated and brought up under the most sacred influences within the family circle, and trained to all that is noble, true and good.

And I know that the work which you have already accomplished has done much to influence our people in this direction, more perhaps, than we, on first reflection, would be willing to allow.

When I look upon my old venerable friend, Col. Stevens, who was a horticulturist from the beginning, and who also is the founder of this city, built the first house and established the first home therein, I need not tell you that he has always been with us and with you, to direct, encourage and assist in the pursuit of horticultural knowledge, and in its application. There are other 'worthy disciples of Flora and Pomona among us whom I should here delight to name, and whose footprints are everywhere found throughout the length and breadth of the city, within our lawns and private grounds, our parks and cemeteries, along our boulevards, lake-shores and river-sides, and even down (I had almost said) into the lap of our loving twin.

How much is due to you ladies and gentlemen for the part which you have taken in our development can never be known.

Long before the state had encircled you within her protective embrace, and without material aid from any source you struggled on alone! Was such perseverance ever known to fail? We trust that your deliberations may be profitable alike to yourselves and to those whom you represent, and the noble work in which you are engaged may still be advanced, as the light of experience and knowledge shall teach.

And when like the song birds that have been swept away by the cold winds that come from the north, but soon to return again with sunshine and flowers, to the same enchanted spot; to the same friends; to the same sheltered bough; to build their nests again and rear their young to fly; so likewise, as the years roll on, and you meet in concourse together, to repair the breach which time has made, and build your hopes anew, you will return to us again, and we shall be glad to receive you, and extend unto you a still more hearty welcome.

RESPONSE TO ADDRESS OF WELCOME

BY CLARENCE WEDGE, ALBERT LEA.

In behalf of this society and of the horticulturists of Minnesota, I thank you for this kind and cordial welcome.

We have come from our cottages among our fields and gardens, the orchards and vineyards of our state. We have come from the quiet of farm homes and the simplicity of country firesides, and we have entered a new world, borne by the hot breath of the engines of commerce, carried along these streets by the force of electric fires, we have arrived at the majestic portals of this noble edifice. After a year of toil among the works of nature, we are met today among the palaces of art, and we enjoy and rejoice in them.

Your busy streets, high walled by the store rooms of trade, the broad arches that span the mighty river, whose powers have been harnessed to your use, your mills and factories, your schools and churches, and that wilderness of roofs and chimneys, domes and steeples, that is spread before us as we look out from these lofty walls, are all to us a wonder and an admiration.

Yes, we rejoice in this your magnificence, and the more for we know that this is no foreign city, but Minneapolis, our metropolis, our market place.

We hear much of the fight between labor and capital, of the struggle between the farmer and the monopolist, but we trust no feeling of envy stirs our breasts as we look upon the products of your enterprise and thrift. For we know that these great works are not for you alone but for all of us. For we know that you have helped us, that it is here our shares are moulded, our reapers fashioned and the thousand implements of husbandry perfected. For we know that our boasted independence left us when we dropped the sickle for the harvester and the flail for the bustling threshing.

"Tis but a few nights ago that we heard the children's merry carol "Peace upon earth good will to men," and the echoes and the lessons of the happy Christmas time go sounding down the year. Yes, the bands of brotherhood are growing stronger, foreign lands are coming nearer, the days of clannishness are passing.

We meet you then today as brother co-laborers for the com-

mon good, as representatives of an industry that would supply you with the noblest of the fruits of the earth.

We do not come with the proud satisfaction of those who have achieved success. The horticulturists of Minnesota have been and still are a band of prophets, but we announce today that our vision is clearer, our faith stronger, our hope brighter than at any former time, and we declare with confidence that the child is born that will see this market abundantly supplied with berries from our gardens, grapes from our vineyards, and apples from our orchards.

"All things come to him who waits." We have waited, we have experimented, we have hoped, we have despaired, some of us for a third of a century, and the foundation of northwestern horticulture has been laid. Yes, it has been light work. In laying this foundation many have grown old, some have grown tired, and some warm noble hearts have ceased to beat. But it has been with the effort, and the vision before us is still inspiring.

The neat farm house nestled among the warm, embracing evergreens, orchards bending beneath the weight of luscious red cheeked apples, vineyards on the hillsides ripening their sweet juices in our blazing August sun, groves and gardens, flowers and vines and all the choice arboreal gifts of God, clustering about the Minnesota homestead—this is the vision that has led us, cheered us, and for the realization of which we labor.

And so, with thanks to you who have so kindly welcomed us, with hearty appreciation of the comforts of your city, we meet again, join hands and plans, and labor for the good time coming.

President Elliot: I would say, ladies and gentlemen, that what I have to say may not seem to you all that should come in a president's address. Some of it is statistical and some of it is matter that pertains to our work, but such as it is I give it to you.

PRESIDENT'S ANNUAL ADDRESS.

Ladies and Gentlemen and Fellow Members of the Minnesota State Horticultural Society:

We meet once more to examine, debate and interchange ideas, after the fruitage and ingathering of the year, and, if possible, prepare for riper judgment in all our future plans or methods

of action. To say anything in an address of this kind that is original, instructive and entertaining, that has not been said before, when all are constantly receiving finely written essays and admirably worded disquisitions, through the medium of the agricultural and horticultural press, full of real, intellectual worth, requires much effort, attention and ability. And when we try to consider the great problem of the successful production of trees, fruits, plants or flowers, in an economic sense, we have taken in hand a subject of great possibilities and of immense extension; also one of vast importance to the present and future generations of this great North Star State.

When we undertake to examine this question in all its relations of theory and practice, it presents themes for contemplation that are far reaching and offer grand opportunities for extending all our potential energies.

It is our province to consider the progress made during the past year, and, if possible, present some new facts gleaned from the practical truths elicited from actual experiences, or knowledge gained by contact with our work and fellow co-workers. The circumstances surrounding and governing the past year are mostly the reflection of those that have preceded, and with a few exceptions, caused by insects, disease, frosts and drouths, the harvests have yielded fair returns. It is said, "Those who endure to the end will be rewarded with successful fruitage and they shall eat the fruit of their doings."

What is more pleasing in the sight of an intelligent, enterprising, industrious horticulturist than having all his trees, bushes and vines full of ripe fruit, or, as Milton says, "Golden trees laden with finest fruits waiting for the harvest," the result of patient, unremitting toil? The first efforts of many a man are often ineffectual, discouraging and fruitless; but constant, unwavering perseverance brings us victory; and to those weak, faithless ones who have doubts and fears about the success of fruit growing in our state, I wish to say that the present outlook is most hopeful and encouraging, and the prospect bright for better returns than in years before, and those who have kept their energies the most active after each disastrous winter, are the ones that have the brightest, most hopeful prospects today. I have faith far beyond any I have had for years before, to believe that there are those who will succeed through their wise, judicious judgment in selection of varieties, location and management. Discouragements are met with in all

classes of industry, but by none more hopefully than the true lovers of horticulture. "It is said that no virtue is acquired in an instant, but step by step;" so horticulture must win its way where there are many combined elements turned against it.

"In all right teaching, we learn principles which are to be applied to facts; and facts from which experiments are to be deduced. The principles, facts and experience which come to us from daily application are full of significance, because they show how nature's laws deal with those who obey as well as those who neglect them."

This is of vital interest to the student in horticulture, and applicable alike in all other professions in life. "Nature never does any one an injustice;" she applies certain material elements, in abundance, and on our part requires conformity to her demands. How much a slight difference in the management and cultivation of our minds, our farms and gardens, may make if we neglect or ignore her teachings.

Did you ever stop to think what a useless waste their is going on all the time in the conduct of your business affairs? The same general law of nature has been and will always be applicable to the farmer, fruit-grower, florist or vegetable gardener, and their success will always depend upon the intelligent care exercised in the preparation, cultivation, harvesting and marketing of whatever they undertake to produce. Did you ever stop to think how much we owe to mother Earth and the natural laws governing all the process of vegetable growth and productions for the enjoyment and sustenance of mankind? Or did you ever think how much or how little a large majority of mankind know or *try* to know about conducting, regulating or assisting the natural laws of production, and how to prevent the useless, wasted, misguided efforts in their life endeavors?

The constant inclination of most of the tillers of the soil, to practice extravagant, wasteful methods in the cultivation and management of their farms and gardens, as well as domestic and business affairs, is the cause of much of the dissatisfaction, discontent and uneasiness that is continually springing up all over our land. There seems to be a prevailing idea that someone or something is at fault, and opposed to our satisfactory progress in business. It is the other fellow that is planning, plotting and scheming against our prosperity, and we do not think of placing the blame where it rightfully belongs. We are too often prone to believe that the world owes us a living

without our using any effort, exertion or endeavor, and if we do not succeed, there is someone else who is at fault.

The general tendency of mankind nowadays is to get the best end of every bargain, or something for nothing, to be more explicit. And is it not the tendency with nearly every one to do as little in return for favors, benefits or services received from mother earth, or his fellowman, as possible?

The sooner we turn our attention inward and come at a true knowledge of ourselves, review our covetous desires, and direct our thoughts towards our own omissions and faults, the sooner we shall find where much of the real cause of our dissatisfaction lies. The key note to every man's success is his reputation, character, responsibility, reliability, promptness and thoroughness in the dispatch of whatever he undertakes; this, with long continued active experience in any business, is a great advantage, and helps fortify him for the smallest venture as well as the greatest enterprise. Whatsoever the employment, the person in charge must possess a high grade of thoughtful intelligence and know his trade thoroughly from the smallest plan of procedure to the largest affairs in his particular vocation. In other words he must be competent to grapple courageously and with confidence all its requirements. You must not only know how to produce, but the demand and supply, the resources and outlets for your particular wares, that you may make the most profitable sales and derive the best possible returns obtainable. It is one of the first duties that everyone owes to himself and his business, to have able and competent assistants, over whom he should exercise personal supervision; with constant care and attention to all the minute details of his business; this will insure success; not more so with the merchant prince than with the amateur or professional gardener and horticulturist. No matter what the calling in life, there must be untiring vigilance vested in each and every action.

As much depends upon the man's creative genius in any undertaking in life as upon the material acted upon. No matter how much or how little the capabilities of the business are, unless conducted by the right kind of intelligence, it is not a success. Theory, no matter how good, unless based upon correct principles, is of little value. Quickness of perception and observation, combined with extended experience, are some of the best teachers to help men to great accomplishments. The

greater the source of supply and ability to produce, the larger will be the output. To the young man choosing a life of usefulness, I bring this thought: It is not so much what will be your line of action, as the manner in which you go about it. There are three things that govern all men more or less,—what to do; when to do the right thing, and *how* to accomplish the greatest results. Neglected opportunities never reach results. So the man or woman, boy or girl, who has the greatest amount of perception, backed by careful, painstaking thoughtfulness, will be capable of originating and producing greater efficiency than the ignorant and thoughtless. Skill and dexterity can only come to those who have labored long and faithfully as specialists in some particular line of work.

To be an expert in horticulture, requires prudent, practical experience, accompanied by some genius or intuitive power for grasping the every-day possibilities of our life work.

However much you think you know about your business, there will always be something new to learn. Let us remember that there are none of us too old to learn something every day, and that we should seek to have a store of knowledge laid up from which to draw at pleasure.

The rapidly increased development of the fruit industries of our state gives us great encouragement, and is a constant source of surprise to all our investigators. Only a few years since, it was thought, and by many predicted, that no fruits of value could be grown here; but even now we have single counties that have produced thirty to forty thousand bushels of apples the past year. The unintelligent inquiries of the novice and unskilled in fruit-growing shows no more surprising ignorance of the fact than similar questions coming from some of those at the head of large corporations, who are supposed to keep abreast of the times in knowledge of the productive resources of our state. Not long since I received a line from the secretary of a large corporation, who would be supposed to know about the various productions grown here, asking, "Do apples ripen north of St. Paul?" and this after the magnificent exhibition of fruits shown at the State Fair of 1890. This is one instance showing how little interest there is manifested by a large share of our people regarding their most useful health-producing product! Of the larger fruits, we cannot boast of as great success as we ought, north of the middle line of the state; but all over the north, east, west and south, we

are today raising to a profit abundant crops of all the fine, hardy varieties of small fruits, unsurpassed in richness of color and sprightliness of flavor.

WILD FRUITS.

We are very glad to report that there is concerted effort being made by some of our leading horticulturists in the northwest, and Mr. VanDeman, pomologist at Washington, in seeking information and giving close investigation to discover all the finer species of wild fruits. Already many choice varieties have been discovered, and these will be placed in the hands of careful experimenters for further development. Prof. VanDeman thinks there is no field of pomology more promising of good results than this, and I hope each and all interested in the progress of the great fruit industry, will give hearty co-operation by reporting any old or newly discovered varieties growing in our state worthy of cultivation, thus rendering the much needed aid to the work in which there are such large possibilities for improvement.

SMALL FRUITS.

If there is any one industry that should be given greater encouragement and more thoughtful investigation, it is this—so full of possibilities for increasing the prosperity of our rural population all over the state. But some one will say, "Why not let the fruit specialist raise the fruit, and the wheat specialist the wheat, and the cattle, horses, swine and sheep all be produced by specialists? Some men can concentrate their brain and brawn on one particular kind of work, while the larger number of our well-to-do, enterprising citizens are only possessed of qualifications for a more diversified pursuit."

Nearly all varieties of small fruits have been fruitful the past year, but the crop has been variable in quantity; some kinds, in certain localities, have given very small returns, which in others have yielded abundant harvests. The reason why there has been so great a diversity in the crop yield should be a subject for our careful investigation, that this may in the future, if possible, be avoided.

Prices for all varieties of fruits have been on the whole remunerative and this with an unusually large importation of all kinds from abroad. Our markets on several occasions were overstocked with shipped fruits, but home-grown, fair in quality, nearly always maintained good average prices. A few early strawberries appeared in the market, from the south,

early in February, but they made up in price what they lacked in quantity. I see by my diary of June 26th, at the time of our summer horticultural meeting, this note: "Owing to the lateness of the season, it is early for strawberries;" and two days later, another item, that shipped berries were very cheap, retailing at 6½ cents per box, while natives were wholesaling at \$2.50 to \$3.75 per crate of 24 boxes. Our native fruits have maintained unusually good prices throughout the year, and this the banner year for shipped strawberries and other small fruits from abroad.

There were received in this city alone through the commission houses, according to a daily compilation of reports taken from the "Minneapolis Commercial Bulletin:"

FRUITS.

Apples, barrels.....	69,849
Bananas, bunches.....	77,607
California fruits, cars.....	69
Lemons, boxes.....	30,979
Oranges, boxes.....	52,518
Pineapples, dozens.....	6,000
Watermelons.....	348,717

SMALL FRUITS.

Blackberries, crates.....	8,051
Cranberries, barrels.....	4,813
Gooseberries, cases.....	539
Grapes, baskets.....	570,379
Grapes, kegs.....	3,400
Plums, bushels.....	198
Raspberries, cases.....	7,806
Strawberries, cases.....	47,190

Total amount of all classes of fruits received at Minneapolis during 1890, in carload lots, is 45,842,726 pounds, or 2,292 carloads of 20,000 pounds each, and this does not include parts of cases which were in with other merchandise, or amounts received by express, which would swell the total several hundred thousand and pounds. Of strawberries alone there were 80 cars or 47,100 cases, or nearly 1,000,000 boxes received, and with blackberries and raspberries added, we have over 108 carloads of three varieties of small fruits, or 1,379,000 boxes, and according to estimates made by the *St. Paul Journal of Commerce*, there were received in the city of St. Paul, re-shipped or consumed in the city during the eleven months ending December 1st, 1890, by the fruit merchants of the city, by all methods of transportation, 77,112,000 pounds of fruit. This showing

should cause many of the producers of small fruits to think of our needs, and the increased opportunities for disposing of home-grown productions. The need of energetic, industrious, skilled small-fruit growers never was greater than at the present time. There are plenty of fertile lands to be obtained, adapted to the growing of all species of fruits that can be grown in a northern climate, and for prices within the reach of all that desire to purchase. Some of these lands are nicely located contiguous to the many railroads that traverse our state, and all that is needed to make them produce abundant, remunerative crops of the finest fruits, is intelligent, judicious cultivation and management, in tilling and marketing.

RASPBERRIES.

I wish to recite one or two instances of what *can* be done with this fruit when all conditions are favorable. The amount received from one-fourth of an acre of Marlborough red raspberries in 1890 was \$130. The berries were so fine they netted the grower, N. J. Stubbs, of Long Lake, 18 cents per quart. The rows were 4½ feet apart, the hills 3 feet, and 3 to 5 canes to the hill. This is at the rate of 90 bushels per acre.

I have another item, gleaned at the State Fair. A man in the Minnesota Valley, by the name of M. L. Lockerby, raised the past year 105 bushels of red raspberries from one acre of ground that brought 12½ cents per quart. These are exceptional cases, but they prove what can be done, and what *has been done* by two men can be done by others, if they have equally good soil, prepare it as thoroughly and take the same care in planting, cultivating, mulching, pruning, harvesting and marketing as they did. I will venture the assertion that this work was not undertaken without some experience and thoughtful, careful consideration of every detail of the work. Such results are not reached by heedless, unintelligent thoughtless management.

VEGETABLES.

The demand for first-class vegetables in our markets is rapidly on the increase, and there has never been a year in our past history when the producers of garden truck could find a more ready sale for all well-grown specimens offered. The past season, on the whole, has been propitious for a good yield, fine in quality, and remunerative prices have, in nearly all instances, been received.

I have another item that may be of interest to some of those interested in vegetable gardening. The following list of vegetables was also taken from the "Commercial Bulletin," showing the amount shipped into this city for consumption and distribution:

VEGETABLES.

Beans, green, boxes.....	2,364
Cabbage, crates.....	2,401
Celery, cases.....	1,155
Cucumbers, crates.....	715
Lettuce, dozens.....	5,018
Onions, young, dozens.....	1,393
Peas, green, boxes	891
Radishes, dozens.....	3,287
Rhubarb, pounds.....	147,405
Tomatoes, crates.....	14,751

This showing should direct the minds of our most intelligent, enterprising gardeners to the fact that there is a splendid opportunity for increased tillage and the raising of larger and better crops of all classes of vegetables, which could be readily disposed of at a profit.

We have one fruit grower and vegetable gardener, Elmer Chandler, of Richfield, Hennepin County, who planted 30 acres of Hubbard squash, in 1890, which produced over 120 tons, or at the rate of 4 tons per acre. You may ask what could he do with so large a quantity. He has a squash house for storing the best in quality, built in such a way that he can keep 60 tons through the winter, or until the markets demand them at good prices, and his intermediate qualities he ships to the Boston, Mass., market, early in the fall, receiving a net price of \$28 per ton. He is a specialist in squash raising and winter storing. We have several other varieties of vegetables that can be grown by specialists; for instance, Mr. Fred Busch, of Richfield, is a specialist in winter and early vegetable gardening, having one of the largest plants for forcing winter vegetables anywhere in the Northwest, over 40,000 square feet of glass. Lettuce and cucumbers are his principal crops in winter. He grew over 21,000 dozen cucumbers and over 250,000 dozen of lettuce last year. The opportunities for a few specialists in celery culture in Minnesota are the best to be found anywhere. Already our markets are demanding large supplies of this vegetable, a large portion now used coming from Kalamazoo, Mich. There are hundreds of acres contiguous to these two large cities that are the very best for this purpose. Some-

one should come here and become a specialist in celery culture.

WASTED FERTILIZERS.

The disposition of city wastes and its rightful return to the soil from which it was produced, is one of the most difficult and unaccommodating problems that is perpetually presented to municipalities and the state at large, and the preservation and conservation of the *wasted* fertilizing constituent elements of plant growth should receive the undivided attention of a multitude of the most intelligent minds versed in specific economic agricultural tillage.

This to the thoughtful, conservative, progressive agriculturist is a very serious question, and one in which every tiller of the soil and political economist should feel the deepest anxiety, for on that depends largely the future prosperity of all classes of society, and especially the farmers of our nation.

The true basis of our business success is an enlarged productive, prosperous agriculture and the underlying foundation and support of its future prosperity will be the zealous retaining of all this wasted fertilizing material that is being continually transported away from the rural districts into the large consuming centers of trade and commerce. Year by year this constant drain and waste is increasing, and unless there is some economical method adopted for saving and returning these valuable fertilizing elements to our farms and gardens, our soils will soon lose their fertility and productive power and the yield be lessened continually until our once rich and fertile lands shall become worn out and sterile. This is one of the most important economic questions of the day, and should have immediate consideration, and ought to be impressed upon the minds of every solicitous, meditative, considerate citizen who has or should have anxiety for the future prosperity of all tillers of the soil. Each year the area of our virgin fertile lands is decreasing at a rapid rate, and on the preservation or deterioration of this fertility will be conditioned the future prosperity of our nation. Prof. Shaler, of Harvard university, says: "In this, as in many other important matters concerning man's relation to earth, foresight has not yet been effectively sustained. Men look upon the earth as in some fashion owing them a living, and, in their brutal confidence, think it will continue to do in the future the part it has done by them in the past." He also says: "The present age is marked by a strong

conviction that man owes much consideration, not only to his fellows, but to the generations to come." With this increase in the sense of duty which men set before their eyes, we may hope in time for the most careful preservation of our soils which is consistent with their utilization. We may soon expect to see the law recognize the fact that a man has only the right to use a portion of the earth's surface in such a manner as is necessary for his immediate needs, care being taken that the reversions of the generations to come have been properly guarded. When this view finds fit expression in our laws, we may expect certain stern limits to be put to the present reckless waste in the heritage of life represented in our soils.

It is evident the soil problem, though perhaps the most serious of all the physical difficulties which beset the future of man, is by no means beyond his control. He may find in it a new and nobler field for the exercise of his intelligence and his prescience than he has yet secured by his careless relations with the earth..

As population increases and the fertility of our soil decreases we shall find a necessity, yea an urgent demand for a better class of tillage. We have only to direct our attention to some of the most populous countries of the earth for an example that teaches us the day is not far distant in the future when we shall be compelled to husband in a better manner the composing elements of productiveness in our soils.

The wasteful methods of sanitation pursued by all boards of health and officers of public trust, in the smallest village as well as the largest city, call for revision and correction. Here is a question of vast importance not only to our state but to our whole country, and it would be well for our whole country, and it would be well for its wise counsellors to consider how far the responsibility rests upon them as legal representatives of the people. We are in a measure accountable to those who come after, and it is expedient for us as thoughtful conservators of this heritage given into our charge, that we accept the responsibility placed upon this generation, and demean ourselves not as prodigal, extravagant, wasters, ever absorbing and never returning, but as just stewards, ever striving to secure these accumulations from such wholesale destruction, that those to follow may derive their proper share of consideration.

INSTITUTE WORK, ETC.

Some of the clearest thinkers and wisest educators are im-

pressed with the prevailing ignorance existing among many of our agricultural classes, and the great disadvantage under which these busy toilers labor in their attempts to keep pace with the rapid progress of inventive genius as applied to the new methods of cheaper production and distribution of all classes of farm and garden products, and are properly inquiring what will become of that part of the community who are unthinking and heedless of the causation of plant growth and fruitfulness, and how little they know about the prevention of many diseases affecting the vegetable and animal kingdom, unless special effort is made in their behalf.

There are comparatively few, indeed, of our medium, intelligent, would-be-progressive farmers and horticulturists who are sufficiently informed to apply many of these useful discoveries and put them into practice themselves without seeking instruction from object lessons or from teachings of a specialist who has had advantage of practical experience in his particular profession.

Never in the history of agricultural and horticultural pursuits was so much being done in our universities and agricultural colleges, and through the medium of the agricultural and horticultural press to improve the methods and disseminate useful knowledge among the tillers of the soil. A new era is dawning in the minds of the rural population of our state, and the farmers as a class are growing eager for instruction and knowledge of the first rudiments of general farming, tree planting and fruit growing. You may be led to inquire why I think this so. We point with exultant pride to the large number of farmers' sons seeking admittance at our State Agricultural School, for the purpose of receiving purely agricultural and horticultural instruction such as is not given in any other state. Also the increased interest manifested in the urgent request that more plain, honest horticultural instruction be given to our Farmers' Institutes. These two modern methods of giving helpful, useful instruction where it is most needed, cannot be too highly appreciated and should receive the fostering care of our present legislators, by their wise and generous support, with liberal appropriations for prosecuting this class of work with vigor in every county and farming community in the whole length and breadth of our state, if we expect to take what should be our proper place and station in the agricultural world, as an enterprising, energetic, progressive people.

Referring to the Farmers' Institute work and the instruction there given, I wish to congratulate the friends of pomology and general horticulture upon the advance steps that have been taken in this line of teaching within the past year. Heretofore the friends of horticulture have not been altogether satisfied with the time allotted to them for this subject or the methods sometimes used in presenting it to those attending our institutes. If the often expressed desires of the people are any indication of what is needed and demanded, we are on the threshold of an advance movement in all kinds of horticultural industries. The people all over our state are growing more attentive to this useful hand-maiden of agriculture, and if the proper means can be taken in presenting the healthful pleasure and pecuniary gain to be derived from enlisting in this useful occupation, the benefits to our state will be widespread and far-reaching. With the means at our disposal in the past, the efforts of the officers of this society to secure some one with just the right qualifications to teach the art of horticulture to the rural population of our state in a faithful, straightforward manner has been nearly futile. The difficulty has been to secure an instructor possessed of untarnished reputation, with distinguishing qualities of character, skill in address, with persuasive expression of thought and honesty of purpose, combined with years of successful experience derived from practical observation in the continuous occupation of agriculture and horticulture. I am pleased to inform you that we have at last been able to secure the services of a man possessing many if not all of these qualifications, in the person of William Somerville of Eyota, Olmsted county, who has been secured by our worthy superintendent of institute work, to fill the position of horticultural lecturer and instructor. Also in this connection, I wish to state that we have at last found a feasible plan for distributing in an economical manner the accumulation of back numbers of our horticultural reports, by placing them with our horticultural lecturer who will distribute to those who will read, appreciate and be benefited by their teachings. The few thousand copies we now have for disposal, will, we hope, plant a little horticultural leaven here and there that may bear fruit in due season. The time was, and not long ago, when the ordinary, unobserving agriculturalist thought he had no use for science or the scientific man, in the cultivation of trees, fruits, flowers or vegetables, but we are glad to say that day has passed.

The many new discoveries brought to light and susceptible of being put into daily, practical use, is attracting the attention of our most enterprising cultivators; and the process of transition from the old methods and ways of cultivation and marketing to the new, is more and more visible. "Each year new inventions and wider spread intelligence have done much to improve the condition and prosperity of a large class of producers, but over and above all this, no one thing has done so as the much steady decrease in freight rates, giving capable produces and employers a wider market, and bringing local producers into contact with more abler competitors than they had known before."

We owe much to railways and the facilities for rapid transfer and wider distribution which they have provided. Edward Atkinson says; "There have been single great inventions, like the application of steam, which have greatly altered the conditions of society; but there have probably never been so many applications of science and invention to the common arts of life as have been applied in the present generation, nor has any single one ever been so patent in modifying and changing all the conditions of society as the sinking of time and distance by the railway system, in reducing the cost of moving farm and garden products to a fraction of a cent per ton per mile, practically converting a wide area into a close neighborhood."

"There is but one element of life which all have in common, and that is time," and he who can teach us how to improve our time to obtain the largest amount of pleasurable enjoyment and beneficial usefulness to himself and his fellows should be counted a benefactor of his race.

QUARTER CENTENNIAL.

The 3d of next October will be twenty-five years since the organization of the Minnesota State Horticultural Society, and it would be proper for our members to come together and celebrate its quarter centennial birthday in some appropriate manner. I call your attention to this fact that you may take such action as is deemed best. If the next twenty-five years of investigation and experiment develop our horticultural industries as much as the past, and our society's work extends in width and length proportionately, we may expect as a progressive, industrious people to make great advancement in horticultural art. If any of our members should be fortunate enough to live to the half centennial of this society, they will

look back with a degree of satisfaction upon their efforts and those of their fellow co-workers, which have been in a large measure instrumental in the development of the various horticultural industries of our state.

That horticulture may be put upon a more business-like, comprehensive basis and be relieved from the great confusion that now exists in the names of many varieties of fruits, flowers and plants, it is thought wise by those giving this subject closest attention, that there should be established a national register that will give the description, history, etc. of plants and fruits, which shall be official and authoritative, and secure to the originator of new varieties, such protection as will justify him in devoting his time, thought and money to the work. Then there would be more inducement than there is now to the skilled horticulturist to devote more of their time to the securing of better varieties than we now have. These desired improvements can only be secured by the enactment of necessary laws by the national government, sanctioned by the United States Department of Agriculture at Washington.

I do not wish to submit any plan, but leave it with you for thoughtful consideration, and would advise the appointment of a committee of three to make some suitable recommendations from this society.

I also call your attention to an extract from the annual message of his excellency the governor of our state, referring to the Columbian World's Fair, to be held in Chicago, in 1893, an event of great importance to our society and the state, if we participate. He says, "No means should be omitted to have the various advantages of Minnesota made known to the thousands who will visit the greatest exposition of modern times." I consider this of special importance, and trust no means will be omitted to provide for a full and complete exhibit, as the results that will accrue cannot fail to be of lasting benefit, and in his suggestions as to expenditure of surplus revenues in the next two years, he indicates to account of World's Fair, \$100,000; a considerable part of this amount should be divided equitably among the agricultural, horticultural and other industries which are largely dependant upon their productions from the soil.

Already the people of Minnesota are agitating the question of a fine display at the World's Columbian Exhibition, and the legislature will be called upon to make a liberal appropriation this winter. Minnesota cannot afford to be in the background,

but should be in the front rank of exhibitors in all the twelve departments as now agreed upon by the directors. If we expect to make such an exhibition as should be made, especially by our horticulturists, there is great need of regular organized endeavor on the part of our society and every person in any way interested in the development of fruits, flowers and vegetables, and a hearty co-operation requested from all citizens, whether members of this society or not. There should be means taken at once to have a committee designated to represent the interests of this society to our World's Fair state commissioners, and one of their duties should be to put themselves in close communication with persons having charge of any horticultural industry, that proper material may be collected, collated and prepared for statistical information to be published in a handbook of horticulture. This would be one of the valuable indicators of our state revenues, in educating the many thousand visitors who attend our World's Fair horticultural exhibition. It would be well to consider at this session, who would be the most fitting person to recommend to our governor for appointment on the World's Fair commission as a representative of the interests of this society.

HORTICULTURAL NEEDS.

What we ought to do, and what we can do, should be considered fairly, judiciously and wisely. All admit we have done and are doing much for the cause of horticulture in our state. Should we not seek to consider this question: "Are there any particular lines of investigation that will give better results, demanding our immediate attention?" One thing presents itself for consideration. No doubt, there now exist many excellent varieties of fruits, particularly of apples, of local reputation, which are not on record in our reports. We have done much, but are not doing enough systematic work in searching out and placing on record the merits of many of our native seedling and other varieties of apples. There may be many of these that have valuable qualities worthy of propagation and wider dissemination, that could be secured if we had means to put some one in the field to search out the varieties adapted to certain localities.

FORESTRY.

I throw out this suggestion with regard to continuing the work of forestry in our society. It seems almost futile for us

to undertake to carry on any part of this work as we are now doing. We do not give the attention to it that the exigency of the times demands. The question arises in my mind whether we should not give this much needed question more consideration than we have been doing in the past. I am willing to admit we, as a society, are not doing as much as we should; neither do I wish to cast any reflections on the means and methods pursued by the State Forestry Association, or criticise any part of their former work, but I think the interests of the people would be better served, and wider scope and understanding given to forestry, if we were to unite our time, talents and means, in giving greater breadth of thought and wise management of this work so much needed upon our immense prairies. As it is, the members of our society do not take the deep interest in this question they should, and I am informed that there are those among the promoters of forestry in our state who think that the essential requirements due from a live organization under the present management of either society, are not being fulfilled to the best advantage, and it would be better to have this work more closely united to that of the State Horticultural Society, and acting on that suggestion, I would recommend appointing a committee to consult with a like committee from the State Forestry Association, and confer with its officers as to the feasibility of uniting their work more closely with the Minnesota State Horticultural Society. I have interviewed some of its officers, and they think the work would be better accomplished if it was put under the directing care of this society. There are considerations for this change that will be presented at the proper time, to a committee having power to act. It seems to be a part of our legitimate work to awaken deeper interest in proving new methods and giving a healthful impetus to this question of forestry. If there is a state in the Union where the people need practical, judicious instruction in the growing of trees and wind breaks, it is Minnesota. We have large areas where the small fruits even cannot be successfully cultivated without first procuring some kind of forest protection, and it seems to me the interests of these two societies should be merged together and work under one head, to derive the greatest benefits to our agricultural classes.

I would recommend by resolution or otherwise that all district or local horticultural societies should hold their annual meeting previous to the annual meetings of the state horticul-

tural society, and be then represented by one or more delegates with a full, but condensed report of the year's progress in horticultural investigation.

I wish to call your attention to one vital point in all our discussions; when we give an instance of success or failure in our experimental work, we should state distinctly the location, with the name of the varieties and address of the person correctly, that it all may go on record for future reference, and all committee reports should state the county and town where made.

INDEX.

I wish to suggest the propriety of printing with our coming volume, a *subject indicator* index of all our previous annual horticultural reports, the subjects of each year arranged together in alphabetical order by sections, giving a short itemized account of what each volume contains. This would be not only of use to the oldest members of our society, but would be valuable information to our new members, citing topics which had already been discussed and in which volume of our reports they could be found.

There should be an individual responsibility resting with each member of our society in securing increased membership and where it is possible, giving a wider circulation to our reports.

In closing I wish to leave this thought with you, if our failures have been without number, our prospects for the future were never brighter. "The highest achievements are not attained without difficulty."

DISCUSSION.

J. S. Harris: I will move that the chairman appoint a committee of three to report day after tomorrow, the first business in the afternoon on the president's address.

Motion seconded and carried.

J. S. Harris: While the chairman is making his selection of the committee I would like to ask a question for my own information and for the information of a good many people in the state of Minnesota. The question comes to me every little while: Have we a state forestry association? I am not aware that we have any. We know there was enough of it so that the legislature recog-

nized it by an appropriation, but if what we understand by a state forestry association is an institution composed of live men, imbued with a knowledge of the work they are engaged in, and with a desire to get together all the information that properly comes within its scope, and to disseminate that information to the people of their state, there is no forestry association in the state of Minnesota, and there never has been, or if there ever was it died a natural death. I claim that forestry is even of more vital importance to the masses of people in the state of Minnesota than horticulture. Without forests we might soon fold up our hands, for greedy men and the wants of manufacture have commenced to devastate our forests and are fixing a road for those northern winds to come down here, and in a short time it will be impossible to raise any fruit except under glass. With such winters as we have had for three years one is apt to forget these things; but if we do not stop this devastation of the forests, and if we do not commence planting forests, and that pretty soon, we might as well abandon horticultural work and seek a place more congenial for man to live. Now if there is no forestry association it seems to me that it is the duty of us as horticulturists to lead the way and try to stir up an interest and have a forestry association organized, and let us go before the legislature, now in session at St. Paul, and ask them to increase our appropriation to such an extent that we can afford to hold a forestry convention once a year three or four days and discuss the forestry question as we discuss the fruit question. We ought to have an appropriation sufficient to pay the expenses of men who will devote their time to the work.

Now one or the other we ought to do, and I hope when the committee makes its report upon the address of the president they will bring in a resolution stating what we had better do, whether we had better apply to the legislature for proper aid, or whether we had better with our friends throughout the country organize a society independent of us.

President Elliot: I will appoint as a committee on the president's address, Clarence Wedge, L. H. Wilcox and J. T. Grimes.

L. H. Wilcox: Our legislature seems to think that forestry was amply provided for, for in 1883, they set aside a certain fund to be devoted to forestry, and that fund amounts to six or seven hundred dollars a year, and for the last six or seven

years that amount has been turned into the fund because there was no use for it.

I offer a resolution and will send it up to the secretary to read.

The secretary then read the following resolution presented by Mr. Wilcox:

"That a committee of three gentlemen be selected to go to St. Paul and extend an invitation to His Excellency, the Governor, Wm. R. Merriam, the state officers and the members of the legislature to visit the twenty-fourth annual meeting of the Minnesota State Horticultural Society, now in session at the Guaranty Loan building in Minneapolis.

"To come at their own convenience, morning, afternoon or evening, Tuesday or Friday, and take part in the discussions and examine the display of Minnesota grown products of the orchard, garden and conservatory, and other objects of value to the agriculturist, horticulturist and all other industries of the state."

President Elliot:—I will appoint on the committee L. H. Wilcox, C. L. Smith and M. Cutler.

L. H. Wilcox:—The meeting of the Bee-keepers Association will necessarily keep me very busy, so I think you will have to appoint some one else on the committee.

M. Cutler:—I am in about the same position as Mr. Wilcox. I am on the executive committee of the Bee-keepers Association, and it will be impossible for me to leave to-morrow morning.

President Elliot:—I will appoint in place of Mr. Cutler, Dr. Moyer, and if Mr. Wilcox thinks he cannot serve I will put Mr. Smith in his place as chairman of the committee.

C. L. Smith:—I regret the question has taken the form it has, but I think it is only just to myself and those associated with me to make just a little explanation. At the same time that the legislature made an appropriation providing for a bounty for tree planting in Minnesota, they also provided a second appropriation of five thousand dollars for this Minnesota State Forestry Association, to be used in the collection and dissemination of information in regard to tree planting in the state of Minnesota. About fifteen hundred dollars of that money was expended when the secretary, Mr. Hodges, died. I was elected as secretary of the association in his place. Meetings were held and about one

hundred dollars more of that appropriation was expended in the distribution of the Forest Tree Planter's Manuals that were then on hand, when the state auditor informed me that the appropriation had lapsed on account of time, and no effort was made to secure any further appropriation, inasmuch as it was supposed by the members of the society, that that money was available to be used at any time. The appropriation having lapsed, there being something like three thousand copies of the Tree Planter's Manual still on hand, the work was carried on until the next session of the legislature, the manual being sent to all who made application for it, and they were distributed at some of the farm institutes and fairs where they were given to the people, and were also distributed from the "Farm, Stock and Home" office. During the session of the legislature in 1887, the forestry committee of the House recommended an appropriation of three thousand dollars. The bill was exactly like the bill of 1881, simply providing for the publication of the manual of forest tree planting, to be prepared by some expert in forestry, to be distributed free to any citizen of Minnesota, and for free distribution of seeds, cuttings, etc., in the interest of the people. That bill passed the House and got to the second reading in the Senate, but was lost the last night of the session. Immediately after that there was a meeting of the executive committee of the association. They requested me to do what I could without expense to the association until such time as the legislature should meet again, when the matter would again be brought forward and we would endeavor to secure money to carry on the work. I did so, distributing largely through the medium of the Farmers Institutes the balance of the manuals we had on hand. I sent them to legislators calling attention to the matter from time to time. The legislature of 1889 met. There was a meeting of the Forestry Association, the bill was prepared and was presented to the forestry committee of the House, and I staid there altogether something over three weeks looking after the interests of the bill. The forestry committee cut down the amount to two thousand dollars instead of three. Finally on the 23rd day of April the bill was signed and became a law. The members of the executive committee were immediately notified and several of them met in St. Paul, and they voted to have a manual prepared at once, revised and corrected according to the best information at hand and the best that could be

procured, and as the Farmers Institute seemed to be the best possible medium by which to get it to the farmers and bring this question of forestry before them, they voted that I should have this manual published in St. Paul, as cheaply as possible, and then attend the farmers institutes, fairs, conventions and places of that kind, wherever the question of forestry could be brought to the attention of the people, but provided always, as the bill provided, that as long as the supply of these books lasted they should be freely distributed to everybody in the state who wanted a copy. I immediately set about that work, and to the best of my knowledge and the best knowledge of those with whom I could correspond I prepared a manual, and I am sorry it did not meet the approval of Brother Harris, as it did meet the approval of the editors of agricultural papers and tree planters throughout the country, very little criticism being made in regard to the book. In every way that I possibly could, by pen and word of mouth, I tried to stimulate an interest in this matter, and I succeeded as well as expected. I arranged with Mr. Gregg to give at least one lecture at each Farmers Institute on the subject of forestry. To you who attended the farmers institutes where I gave that lecture and exhibited the chart in regard to the arrangement of trees around the homestead I need not say that it was well received. In addition to that I prepared a pamphlet on forestry, of which I had ten thousand copies printed. I also had circulars sent out over the state regarding the planting of evergreens, as the executive committee instructed me to use about two hundred dollars of that money for the distribution of evergreens; that plan was generally approved, although there was some very severe criticism, but on my own responsibility, believing it would meet the approval of the president of the association, I distributed some three thousand. The entire first edition being exhausted, I secured the printing of five thousand more. Now I got that printing done so cheaply that the entire ten thousand cost only a little more than half as much as the first five thousand. What that book is, whether it contains the information our people in the state would like, I will not say anything about, but the book is here and will speak for itself.

Now, so much as regards the forestry question. During this time I have done the very best I could possibly do. Every voucher, every amount of money expended has been thoroughly looked over by Governor Marshall and Auditor Braden

where the fullest approval has been given. I have consulted with some of the men here in regard to calling a meeting of the Forestry Association. Now, I certainly heartily approve of any plan by which the matter can be made more effective.

J. S. Harris:—I have not said one word against the forestry report.

Secretary Samuel B. Green then read his annual report.

ANNUAL REPORT OF THE SECRETARY, SAMUEL B. GREEN, FOR THE YEAR ENDING JANUARY 20, 1891.

MEMBERS OF THE STATE HORTICULTURAL SOCIETY. *Ladies and Gentlemen:*—I recognize the fact that is generally expected the secretary of such organizations as this will make a report of considerable length touching upon the important horticultural events of the year. I would gladly do this, but the many calls upon my time are such that I shall not be able to gratify this *assumed* desire on your part.

THE PAST YEAR.

The past year has been one of much advancement and interest in horticultural lines of work. Every old orchard as well as most young trees in this state, have borne astonishingly large crops of apples, and this when throughout sections generally esteemed as the great fruit producing part of the country the crop has been very light, or a complete failure. This has led to an increased interest in the planting of orchards and made the sale for nursery stock the past fall larger than for many years. Many failures will undoubtedly result from the planting of tender varieties and also from improper care. Our society has done and is doing much to educate the people of the state to a proper understanding of the essentials for successful fruit growing. This requires constant care and effort on our part and some of you have assured the success of the work by your self-sacrifice and devotion. It is an important work and should be given it in all times and in all civilized countries the pains taking care of the brightest minds.

I congratulate you on the success thus far obtained and I believe after careful consideration that you are warranted in the faith that apples can and will be grown successfully in Minnesota. When I accepted my position in the university now nearly three years ago, I knew of the general enterprising character of the citizens of the state, but I had no intimation

that the horticultural society of a state so far north and noted for its severe climate, could have so much enterprise, push and perseverance as a careful study of your history will show to the most casual observer. I want furthermore to congratulate you on the perfect harmony manifested at our meetings and in private among our members. It is in unity that our strength lies; I trust it may long continue. Our membership is on the increase and we can boast a larger membership and better meetings than similar societies in most of the great fruit growing states.

FARMERS' INSTITUTES.

It is in these institutes that our best opportunities lie to do the missionary work of recommending the proper varieties of fruits to plant and the best method of caring for them. At present the horticultural work with them is attracting much attention, and I think that Supt. Gregg, whom we all highly esteem, but whom we have never considered an enthusiastic horticulturist, I think even he is of the opinion that in Mr. Wm. Somerville, with his practical helpful fruit talks, he has secured an attraction of intrinsic merit. I was much pleased to hear recently that Supt. Gregg had found the interest so great in the fruit talks that he had a half hour cut off from the consideration of pork and had it devoted to fruit growing.

LAST REPORT, VOL. XVII.

The last report was much delayed in print. This was owing principally to the fact that by reason of a strike of journeymen printers in the spring, the state printers were crowded with work all summer. On assuming the office of secretary I found that there was a determination on the part of the state printing commissioners to cut down our edition of reports. I was referred to the fact that there were numerous old reports in the basement of the capitol building and that they did not want reports printed that could not be used. I insisted upon the full legal number and they were printed. After the reports were printed it required a special hearing and urgent presentation of our case before I secured the one thousand bindings which we have received. This is a larger number than the state has furnished us for several years and is as many as I think was contemplated by the law when it was passed. Another new feature in the report is its being printed with all the essays and papers set in "solid" type and the discussions only "leaded,"

instead of as heretofore with the whole matter leaded which makes a much neater page. This I objected to, but as the state law requires 2,500 ems to the page and as all the other state reports were similarly treated I could only submit to it as the inevitable. This law in regard to state printing has not been generally enforced for many years but the abuses which have arisen on account of the laxity has brought about a strict compliance with its letter. It seems to me it would be much better for the society if we could have the cost of publishing the report added to its annual appropriation and then let our own printing contract. I am sure it would make the work of the secretary much pleasanter and we would then be able to push the work, but so long as the secretary must await the option of the state printer he can not be responsible for the time of the issuance of the report.

TIME OF HOLDING OUR ANNUAL MEETING.

If we could change the time of our annual meeting so that it would occur in December, we would then be sure of getting our reports distributed by the first of March as is customary in Illinois, where their meeting is held at that time. If the meetings were held then, the copy could easily be in the hands of the printer by the middle of January, and at a time when ordinarily they have but little to do, they would then push it through to completion in a short time, while if the meeting is held in January the copy comes into the printer's hands when he is busy with other state printing.

FARM SCHOOL.

Our farm school is a great success; we have now over one hundred students of a high class of boys, which is about as many as can be accommodated. It is only within a few years, perhaps in this state within the last six years, that the larger part of the farmers have become convinced that any special education was needed in order to pursue their avocation successfully. I think too, that many of the states have made the mistake of making the standard of admission to their agricultural college too high, and they have thus excluded those whom these institutions were designed especially to benefit. We would, I think, have been the gainers had we begun with low grade agricultural schools. At present all over the country there is a loud call for agricultural education. The demand is that it shall be helpful by being practical, painstaking, cheap

and accessible. In Minnesota we have the most successful of these schools to be found in the country and educators in other states are looking to us and wondering if we have solved the problem. Only within a fortnight the professor of agriculture of the Maine agricultural college was looking over our farm school with the idea of profiting by what he might see that would aid him in starting a low grade agricultural school in his state. He remarked to me that he had twelve boys in his classes of agriculture, while in the same institution over one hundred were taking the course in engineering. He also said that he had read about the success of our school, but felt it necessary before believing the report true, to come and see it himself.

It is not necessary for me to dwell on the importance of agricultural education to an audience composed of horticulturists such as I see before me. You know of its value. You are confronted by many problems and have always shown yourselves appreciative of any efforts that have been made to make agriculture a rational science and to do away with the empirical formulas and quackery that have so often hindered its development. I have been identified with agricultural education for the last sixteen years, since when a boy with a love for it, I entered the agricultural college in Massachusetts.

I thank God that I had a father who had a broad idea of the possibilities in agricultural education and who encouraged his son with the remark that it would yet be many years before the market for educated farmers would be overstocked. I love this work and believe it has great possibilities, which are probabilities. I object now and have always objected to agricultural schools whose graduates mostly become book-keepers, merchants and engineers, and I repeat now what I have often said in private to my colleagues, that the success of the agricultural school of Minnesota lies not in graduating book-keepers, merchants, etc., but in having ten years hence an active, aggressive, earnest, successful alumni on the farms of the state. The time is coming when every legislature that convenes at our capitol will have in it some graduates of the state agricultural school. This will not come because they prefer politics to honest business, but because they will manage well in their own business; will have clear cut, clean ideas of what is best for their occupation, and the offices will be forced upon them. It will be a happy day for our state when that time comes. Such young men are

needed today, and at this very moment, to prevent the great victory of the farming element from being anything more than a temporary affair, and its successes from being excesses.

REPORT AS LIBRARIAN.

At the last annual meeting of the Society the secretary was made librarian, and I at once appointed our friend, Mr. E. A. Cuzner, as assistant, and he has practically done the same work as heretofore, only he has done more of it on account of the sending out of many more reports than heretofore. I am sure that he has many times over earned his salary. Besides sending the reports to the persons designated by law about 70 sets containing most of the issues since 1880 have been sent out, besides about 1,600 reports have been distributed at the farmers' institutes.

BACK NUMBERS OF THE REPORTS.

All the reports of the past issues that were in the basement of the capitol building were early in the summer transferred to the University where we have found good temporary quarters for our library. Many of these reports have been distributed at the farmers' institutes and the remainder (excepting about 100 of each issue retained for exchange) will be distributed at the present series of institutes where they are much sought after.

FINANCIAL REPORT OF SECRETARY.

<i>Receipts.</i>	
Membership fees	\$74.00
Stamps sold.....	.50
Received from treasurer on reports.....	100.00
 Total receipts.....	 \$174.50
<i>Disbursements.</i>	
Postage on reports, etc.....	\$93.87
Miscellaneous expenses.....	16.84
Printing.....	8.25
Plate of Chas. Hoag for frontispiece, Vol. XVIII.....	10.00
Paid treasurer to balance account.....	45.54
 IN CONCLUSION.	 \$174.50

In conclusion I wish to thank the society for the honor they have conferred upon me by electing me to this position. The duties of the office are many and varied, and require much attention. I leave particularly impressed by the ease with which

a conscientious secretary can increase his sphere of influence. It is a very fruitful field of work, and its scope could be easily and to advantage enlarged. I have enjoyed serving you. The office has brought me into contact with the people of the state more than any other occupation at which I could have spent my time.

Owing to the increased interest and attendance at our farm school the time which I must devote to teaching increases with each year. I now find it will be quite impossible for me to occupy the position of secretary another year, and whosoever you may select as my successor I shall be glad to aid in any way that I am able. Before closing I wish to thank you for your courtesy and uniform kindness in aiding me at all times in the discharge of my official duties.

L. H. Wilcox:—As there are several suggestions in that report that should receive consideration, I move that it be referred to the committee on the president's address.

President Elliot:—It will be so considered unless objection is made. We will now listen to the treasurer's report.

ANNUAL REPORT OF TREASURER.

DITUS DAY, FARMINGTON.

TREASURER'S REPORT FOR THE YEAR ENDING JAN. 19, 1891.

Receipts.

1890.

Jan. 20, Received from State Treasurer.....	\$500.00
Jan. 22, Philip Herzog, life member.....	10.00
Jan. 22, Membership fees.....	44.00
July, Received from State Treasurer one-half year appropriation.....	500.00
Total amount received.....	\$1,054.00

Disbursements.

1890.

Jan. 22, To balance due treasurer (overpaid on last year).....	\$128.14
Jan. 22, J. M. Underwood, expenses as ex. com.....	3.00
Jan. 22, L. E. Pierson, type writing.....	3.70
Jan. 22, M. Cutler, expenses as Vice-President.....	2.50
Jan. 22, S. D. Hillman, balance on settlement.....	6.73
Jan. 22, J. L. Harris, ex. as seedling com.....	25.00
Jan. 22, L. H. Wilcox, ex. to ex. com. meeting.....	5.88
Jan. 22, O. F. Brand, railroad fares.....	4.39
	<hr/>
	\$179.34

Premiums at Winter Meeting of 1890.

Jan. 24, M. Pearce, best potatoes, 1st prem.....	\$2.00
Jan. 24, R. P. Lupton, prem. on vegetables, canned fruits, honey, etc.....	13.50
Jan. 24, J. A. Sampson, prem. on beets, potatoes, turnips, cabbage.....	7.50
Jan. 24, Joshua Allen, prem. on beets, carrots, parsnips, etc., display of vegetables.....	8.00
Jan. 24, Sidney Corp, prem. on apples.....	7.00
Jan. 24, Wm. Duffus, 2nd prem. on apples.....	4.00
Jan. 24, Mrs. A. A. Kennedy, prem. on syrup.....	2.00
Jan. 24, J. S. Harris, prem. on three best collections of apples and winter apples.....	3 00
Jan. 24, E. Wilcox, prem. on best display of apples and plate of winter apples.....	5.00
Jan. 24, F. G. Gould, best display of flowering plants and roses.....	10.00
Jan. 24, R. J. Mendenhall, best cut flowers, collection of roses	8.00
Jan. 24, Mrs. S. D. Perkins, best display of jellies.....	2.00
Jan. 24, L. H. Wilcox, best vinegar, 2nd comb honey, extract honey.....	5.00
Jan. 24, J. W. Murray, best comb and extracted honey	6.00
Jan. 24, C. Thielman, 3rd best extract honey.....	1.00
Amount of premiums at winter meeting.....	\$84.00
March 17, M. Cutler, expenses at com. meeting.....	3.80
March 17, Ditus Day, expenses at com. meeting.....	1.79
March 17, J. M. Underwood, expenses at com. meeting	5.00
March 17, J. S. Harris, expenses at com. meeting.....	7.00
March 20, O. F. Brand, expenses as delegate to Wisconsin.....	17.59
March 20, E. A. Cuzner, salary as librarian.....	14.34
March 20, O. F. Brand, traveling expenses as member com. on fruits and flowers	10.00
April 12, Samuel B. Green, 1st quarter's salary.....	20.00
June 19, Samuel B. Green, on 2nd quarter's salary....	125.00
July 17, Samuel B. Green, bal. on 2nd quarter's salary.	100.00
July 17, Samuel B. Green, bal. on 2nd quarter's salary.	25.00

Premiums at Summer Meeting.

July 22, Joshua Allen.....	\$12.00
July 22, R. P. Lupton.....	5.50
July 22, Wm. Mackintosh.....	3.50
July 22, Wm. Lyons.....	15.00
July 22, J. G. Bass.....	5.00
July 22, F. G. Gilmore	4.00
July 22, E. Nagel & Co.....	5.00
July 22, Martha Lyon.....	4.00
July 22, F. G. Gould.....	14.00
Amount of premiums at summer meeting	\$68.00

Sept. 12, L. H. Wilcox, executive com. meeting ex....	2.10
Sept. 12, J. S. Harris, executive com. meeting ex.....	7.20
	<hr/>
Sept. 18, Samuel B. Green, postage on reports.....	\$ 9.30
Oct. 10, Samuel B. Green, 3rd quarter's salary.....	100.00
	125.00
Nov. 14, M. Cutler, expenses to ex. com. meeting... .	4.00
Nov. 14, J. S. Harris, expenses to ex. com. meeting....	6.90
Nov. 14, L. H. Wilcox, expenses to ex. com. meeting ..	2.00
	<hr/>
Dec. 23, Samuel B. Green, fourth quarter's salary.	\$ 12.90
1891.	125.00
Jan. 15, Samuel B. Green, salary as librarian.....	10.00
Whole amount paid out.....	<hr/> \$1,025.47
Balance in treasury.....	28.53
	<hr/> \$1,054.00

Respectfully submitted,

DITUS DAY, Treasurer.

It was moved by Mr. Brand that the report be referred to the auditing committee, and was so ordered.

President Elliot:—That constitutes the program of the evening. All that we have passed is the paper by Col. Stevens on the chrysanthemum, and the reports of the local societies were passed this afternoon for want of time, and if we do not get time to take them up in detail we may be able to sandwich them in sometime. We have a very full program, a program that will cause a great deal of discussion, and whatever anyone has to say on whatever topic, they will have to say it in as few words as possible; if not we will drop behind a good deal tomorrow.

The meeting will now stand adjourned until tomorrow morning at nine o'clock.

WEDNESDAY MORNING,

JANUARY 22.

The meeting was called to order at 9:30 o'clock by President Elliot.

President Elliot: The first order of business is the announcement of committees.

The following committees were then announced by the chairman:

Committees on award of premiums on apples and grapes:
M. M Frisselle, Edson Gaylord and J. T. Grimes.

On vegetables and pantry stores: M. Pearce, J. F. Gilmore and G. W. Fuller.

On plants and cut flowers: J. M. Underwood, W. Lyons and J. S. Harris.

On honey: Wm. Urié, J. M. Doudna and C. Thielmann.

Publication: A. W. Latham, S. B. Green and J. H. Stevens.

Final resolutions: C. L. Smith, A. W. Latham and Clarence Wedge.

Obituary: E. H. S. Dartt, J. H. Stevens and J. S. Harris.

President Elliot:—The next thing on the program is Orchard Topics, and we will have a paper on that subject by Mr. Brand.

Mr. Brand then read the following paper: "Protection of Fruit Trees, from a Nurseryman's Standpoint," by O. F. Brand, Faribault, Minn. (*See index.*)

The secretary then read the following paper: "Protection of Fruit Trees, from a Farmer's Experience," by Seth Kenney, Morristown, Minn. (*See index.*)

The subject of these two papers was then fully discussed.

President Elliot:—We have a short paper that Mr. Smith will read; perhaps it will give us some light on this subject.

Mr. C. L. Smith then read the following article, written by Mr. Gaylord and clipped from the *Western Rural*: "Shall we Gather from the Ruins," by Edson Gaylord, Nora Springs, Ia. (*See index.*)

The secretary then read the following paper: "Experience in Orcharding in Minnesota," by H. L. Gordon, Long Lake. (*See index.*)

J. O. Barrett:—If there is nothing special, I want to submit something for future debate. I have some resolutions here I would like to read.

President Elliot:—What is the nature of those resolutions?

J. O. Barrett:—In reference to forestry.

President Elliott:—Forestry has been passed, and unless they vote to take it up again we cannot take it up, because our program will not admit of it.

J. O. Barrett:—Mr. President, if you will permit me to read these resolutions I am satisfied the members will be prepared to take up the matter and handle it as it deserves.

President Elliot:—Unless objection is made you can proceed to read the resolutions.

Mr. Barrett then read the following resolutions:

"WHEREAS, Our natural forests have been well-nigh ruined

by syndicates and other speculators, and their reconstruction on the prairies does not equal their destruction, and

"WHEREAS, The people of Minnesota and contiguous states are reaping the effects of such disaster by a change of climate to a more fickle and rigorous one, largely drying up our once numerous springs, lakes and rivers, thus lessening our crops and otherwise retarding all our business interests; therefore,

"Resolved, that this society as the guardian of forestry and "fruit raising in Minnesota hereby declares it its purpose to "give this matter special attention.

"That while co-operating with the Farmers Institutes as a "powerful ally of enlightenment, we regard the organization of "horticultural societies in all parts of the state as auxiliaries, "and thus making forestry a specialty to complete our work "preparatory to fruit raising.

"That a committee of three, including the secretary, be "elected from our members, placed under the control and man- "agement of the executive committee, whose duties shall be to "collect all facts relative to damages done by disafforestation "and report the same, and by agreed methods of co-operation "with Farmers Institutes endeavor to reach the masses on a "large scale in their horticultural instruction, organizing a "Northern Horticultural Association as a counterpart of the "Southern, and the eventual establishment of an experiment "station in the Northern central portion of the state.

"That said committee be authorized to assist the legislative "committee in formulating a suitable appeal to be submitted "to the present legislature, especially designed to save the "balance of our northern forests and encourage the raising of "new ones among our farmers.

"That said committee make an earnest effort to procure an "apportionment sufficient for this society to accomplish this "most needed enterprise."

President Elliot:—You have heard the resolutions, what will you do with them?

Prof. Green:—I do not want see these resolutions adopted until they have been discussed. I move they be laid on the table until some future time when they can be discussed.

This motion was seconded and carried.

President Elliot:—The next paper on the program is by Mr. Underwood on the future of orcharding.

J. M. Underwood:—In regard to protection, it has been suggested that we should follow the teachings of nature, and it re-

minded me of an experience that I have been familiar with. I had some very handsome hard maples that I planted on the roadside, and they were beauties as I thought, and were the best trees that I could plant. Now I can say this of the row of trees that were planted on the north side of the road running east and west, I think they must have been from four to six inches in diameter, and they were good sized, handsome trees; these trees were every one destroyed by the bark bursting: It was done late in the winter and early in the spring. Then on the south side of the road the hard maples were badly injured, but where the trees protected each other they were not hurt so much. Now this seemed to indicate that they needed protection, and where they were protected they were benefited by it. They were as handsome small trees as I ever saw, but the bark would burst so far around that there would be no more than an inch on the north side, and one tree was so badly hurt that it blew over the next season—a tree twenty-five to thirty feet high.

Mr. Underwood then read the following paper: "Future of Orcharding in Minnesota," by J. M. Underwood, Lake City, Minn. (*See index.*)

A short discussion ensued.

The secretary then read the following paper: "Influence of the Stocks on Development of Orchards," by J. L. Budd, Ames, Iowa. (*See index.*)

A few remarks were made on this paper.

The secretary then read another short paper by Mr. M. Pearce of Chowen.

Pres. Elliot:—We have with us here today a gentleman who has done a great deal for Minneapolis in the way of parks, and I wouldlike to introduce him to you. I refer to the Hon. C. M. Loring.

Fellow members, ladies and gentlemen, I have the pleasure of introducing to you the Hon. C. M. Loring.

REMARKS OF MR. LORING.

Mr President, ladies and gentlemen: I am very glad to meet you. I am sure this is a very unexpected attack. I came in here to hear something and to see the flowers, and I can assure you I am not prepared to make a speech. Our friend has taken me entirely unawares, but I will say, gentlemen, that I have been very much interested in the work you are doing, and

for a good many years I was a member of your association. Other duties have taken my time so that I have not been able to attend your deliberations as I used to do; in fact, I have been away so much in the winter time, and your winter session has been held about the time I usually leave the city.

Every time I come to a meeting of this kind and see the progress made in the growing of fruits and flowers, I assure you that I take more and more pride in the State Horticultural Society of Minnesota. I never go to Boston that I do not visit the horticultural society rooms. Every month they have an exhibition of flowers or fruits there, one or the other. I visited the exhibit in the New York Life Insurance building this fall in this city, and I never was more surprised in my life than I was to see such a fine display of flowers. I came directly from Boston, where I had visited the rooms of the State Horticultural society, where I had seen an exhibition of flowers, especially of azaleas and chrysanthemums, and when I saw this exhibit here in this city of Minneapolis, I said we are going to beat Boston by and by. (Applause.) It was positively surprising; we had a better exhibition of chrysanthemums than they had in Boston. It would not be possible to get up a finer exhibit than we had here last fall.

Now as I look about the room today and see the exhibit of flowers we have here, my mind goes back to the time when I believe that I pretty nearly alone started the first floral exhibition in Minneapolis. It was held in Harrison hall on the 4th day of July, about 1872, I think. We had a great many committees, and we had a great many more members of committees than we had flowers, but we got the ladies interested and went to work with a will. On the day before the 4th of July the old Harrison hall did not look much like a flower garden, I assure you. I employed an old German friend of mine, Mike Smith, (most of you know him) to trim the room with evergreens, and we piled in all the evergreens we could get, we thought we would have something anyway, but no flowers came; so I engaged all the expressmen I could press into service to go about among the ladies of the town and get what flowers they had, and that kind of interested the ladies a little, and by 10 o'clock the morning of the fourth of July they began to come in and help to arrange the hall and flowers, and when twelve o'clock arrived we had quite a flower show. We had no such display as you see on that table down there; we had no gloxinias and agaleas, none of the rare flowers; we had plenty

of begonias, geraniums, pinks, etc., no rare flowers at all, and yet that meeting was a great success. We paid our premiums just as we agreed to, and we had money in the treasury, and the next year we had better success. Friend Elliot has been here all the time; he has the same color in his hair I have; he was then with us. We had then in our treasury seven hundred dollars, and I do not suppose we have had that amount in the treasury since. We afterwards joined in the fair project with Col. King and our seven hundred dollars were swallowed up and we have not seen it since.

I have now in my possession a list of the ladies who served on those committees, and the work they commenced then, you see the results of here to-day.

I have been quite a traveler since then. I never fail to visit anything like a flower or fruit show, and I never come home to Minneapolis but what I am more proud of our city than ever, and as I said, we are going on until we reach Massachusetts. They have had their floral and horticultural exhibitions for the last fifty years, and when we reach them our young state will have reason enough to feel proud.

Now, gentlemen, you have been doing a work that is of more importance to the state of Minnesota than any of you realize yourselves. You not only educate people in their aesthetic tastes, but you are bringing here dollars by reason of these fruits and flowers, and the flower trade of Minneapolis to-day is much larger than any of you realize. If I had had any idea that I was to be called upon to say a word when I came in here, I would have taken pains to get some statistics. My friend here just tells me that one firm alone sold fifty thousand dollars worth of flowers last year. Just think of it. I do not suppose that all the flowers and shrubs we had in our exhibit, and we had everything we could find in Minneapolis worth having, I do not suppose the whole arrangement we had there was worth a thousand dollars. Now think of it; one concern alone sold over fifty thousand dollars worth in one year.

Now as far as fruit is concerned, we are laboring under some disadvantages with some of our fruit. I have almost become discouraged myself, but I suppose it is because I have not had anything to do with them for the last ten years, but your small fruits you grow are finer than are grown anywhere else in the world. I go to California every year; they do not begin to have any such grapes in California as you have here, or within a few miles from here. A gentleman who

raises grapes for the market told me that nowhere else are grapes raised as profitably as they are here. We do not get the quantity of grapes here they do there, but the quality is better, and I think the little Delaware is the finest grape raised. (Applause.) That is only one of your fruits.

You cannot go to California, neither can you go to Italy and sit down to the table today and bring on such grapes as you have here. You cannot see such a sight in California. They have no grapes in California in winter. They have some half-dried raisins; that is the only thing I saw in the shape of grapes. You cannot get them.

Gentlemen, I do not intend to take up more of your time. I am glad to meet you. You are doing a great work, and you are entitled to the thanks of every man, woman and child in the state of Minnesota. (Applause).

Col. Stevens:—I will simply add a word to what Mr. Loring has said. He helped to organize this State Horticultural Society, but he got so wealthy that he abandoned us; but he says he is going to become a member again.

President Elliot:—We feel very much encouraged by these remarks of President Loring, and I hope you will take better courage and see if you cannot improve on what you have been doing.

Now if Col. Stevens will come forward and read his paper it will conclude the program for this morning.

Col. Stevens then read the following paper: "The First 'Mum' Exhibition," by Col. J. H. Stevens, Minneapolis. (*See index.*)

President Elliot:—I will say that the Colonel has touched off our chrysanthemum exhibition we had here in November, which was thought by those who took part in getting it up was doing pretty well for their first effort, and I wish to say to the friends here that next year the florists expect to excel what they did last November. Already many of them have got their plants started for this year's exhibition, and they expect to have a show here that will exceed anything west of the Atlantic coast.

We have only ten minutes left to twelve o'clock. We have a question box to which I promised we would devote fifteen minutes, and we shall probably have to run a little over time.

(*The replies to these questions will be found under the proper heads.*)

President Elliot:—This closes our program for this morning. We will now adjourn to half past one. The beekeepers will be in session here this afternoon and evening.

WEDNESDAY AFTERNOON SESSION.

JANUARY 21.

The meeting was called to order by President Elliot.

President Elliot:—There are one or two things we passed over this morning that perhaps we had better take up and dispose of before the beekeepers go into session.

I wish to call the attention of the members to the maps that are on the wall here. These are maps that have been loaned to us from the geological survey of Prof. Winchell, and they will come up later in our discussions, but I just want to make this little explanation in regard to them so you can be studying them before the discussion comes on.

Prof. Green:—Our idea in bringing these maps here was to show you what an important work had been done. Last year there was considerable discussion as to the advisability of publishing a map showing the various features of the country. There are twenty of these maps and each one shows some different feature. Thus one map shows the general outline of the state, another shows the geological features, another gives the forest area, another the water area, and the prairie area, and they are all worth studying. These maps were gotten up at a great expense to take to the New Orleans Exposition, and they are well worth studying, and we propose to draw some lessons from them when we reach that part of our business.

President Elliot: In reference to this hall; it was donated to us free by the Guaranty Loan Company on the condition that we are not to deface or injure it in any way, and we are to use it as long as we want it, or until we get through with it this week.

Then there is the matter of an amendment to the constitution. I believe that has not been taken up yet and it would be well to consider it now. An amendment has been passed up here, perhaps it will cover the point.

The secretary then read the following proposed amendment to article III of the constitution:

“Local or county horticultural societies and kindred organizations may become auxiliary to this society by sending three

delegates to the annual winter meeting, who shall be entitled to all the rights and privileges of membership, upon furnishing to the secretary of the society a list of members of their society and a report of the proceedings thereof."

Referred to the committee on constitution.

J. S. Harris:—I wish to make one statement. We have been requested to change the date of our annual meeting, so as not to conflict with the state of Iowa. I was notified that Mr Lyon would be here, but he is not here, and I will give notice to change the date of our annual meeting so as not to conflict with the state of Iowa.

President Elliot:—We will now vacate and the beekeepers will step in and use the program until our turn comes again.

THURSDAY MORNING SESSION, JAN. 22.

The meeting was called to order by President Elliot.

President Elliot:—As none of the gentlemen who are down on the program are present, we will have to fall back on Mr. Harris with his report of the seedling fruit committee. Mr. Harris has received a commission from the secretary of agriculture to visit various parts of the state and examine varieties of apples, and afterwards to visit the seedlings and report, and what he has found will be a surprise to the society. He is not at liberty to give the report, because they want to incorporate it in their annual report.

Mr. A. W. Latham then read the following paper: "Apple Growing Around Lake Minnetonka," by A. W. Latham, Excelsior, Minn. (*See index.*)

A spirited discussion followed the reading.

President Elliot:—All the committees are at work now, and will no doubt be ready to report at the proper time.

H.L.Gordon:—Mr.N.J.Stubbs told me to give the members of the society his respects and tell them he felt as much interested in the work as he ever did, but he would not be able to make out his report this year.

President Elliot:—Ladies and gentlemen: I have the honor of introducing to you Mr. George Robinson. He is quite a noted grape grower, rather on the amateur order. He grows his grapes at Minnetonka and lives in Minneapolis. He is considerably interested in horticulture. He promised to give us this same paper last year, but for some reason we did not get it.

Mr. Robinson then read the following paper: "Grapes," by George Robinson, Minneapolis. (*See index.*)

A discussion followed the reading.

Mr. C. L. Smith then read the following paper: "Grapes," by J. S. Sewall, St. Anthony Park, Minn. (*See index.*)

The following paper was then read by the author: "Treatment of Fungus Diseases of Grape Vines," by A. W. Latham, Excelsior, Minn. (*See index.*)

Next Mr. J. S. Harris read the following: "Grape Insects and Diseases," by J. S. Harris, La Crescent, Minn. (*See index.*)

A discussion ensued on the subject of these papers.

Col. Stevens:—There is a very important matter here that should be considered, and that is in regard to the timber brought here from Iowa, by Mr. Gaylord. He has taken a great deal of pains and trouble to get it here, and if we had a time set to examine it I think we could derive a great deal of information from it,

President Elliot:—We will have to take that up as we can catch it. I wish to call on Mr. Somerville. He is our horticultural lecturer in the field this winter, with the farmer's institutes, and he will explain to you what they are doing.

Mr. Wm. Somerville than addressed the society as follows:

Mr. President, Ladies and Gentlemen.:—I feel really somewhat embarrassed to get up before a crowd of men and women like I see before me today, who for years have been toiling along in horticulture with their failures and successes. I am limited for time, hence I have got to get through what I have to say in the shortest and most condensed form that I can get it into.

We have been meeting together here as horticulturists for a number of years. We talk about raising fruit and cultivating it and all that kind of things. A year ago the question came up whether we were doing anything for the farmers, or for the benefit of the farmers at large. I think I started the point that there must be a missionary put in the field in order to instruct and enlighten the farmers in this state in the works of the Horticultural Society. It was agreed that that was the true plan, but I little expected when I made the suggestion that that missionary would be a young man like myself.

I am a farmer, have lived on a farm all my life, with hay-seed in my hair, and I represent that class of men. I am glad to see the farmers taking such an interest in horticultural work. Now I am a farmer that lives on my farm and spend my money in town. The agriculturist really lives in town and

spends his money on the farm. That is simply the difference between the two classes of farmers.

Now for the institute work. I have attended some eight institutes, and I will say to you that if ever there was a plan devised by this Horticultural Society for the education of farmers, it is through this medium, and never has there been such attention paid to any set of teachers as there is at these institutes. I want to say right here that we have not had an institute where there have not been from two hundred and fifty to five hundred people in attendance. I have made it reasonable. Up at St. Cloud we had a room not as big as this, but at least one-half, and there were many who could not get into the house to hear us. We have represented each branch of farming. There is the horse man, there is the cow man, there is the sheep man, there is the pig man, and there is the Honorable "Me" of the horticultural class. We hold a two days' session, and many have come a distance of thirty miles to hear us, and they have all been attentive listeners, and I think every place we have been they have not been disappointed with the instruction they have received. Now as for our time, it is divided. Each one has a certain time allotted to his subject. We could take in a great many more subjects, but we should have to have a good deal more time.

Now I will tell my work, which is allotted to me. The opening session of the first day they put me on talking about small fruits. I take all the pains possible in telling them how to cultivate small fruits, how to prepare the ground, how to set the plants, how to cultivate strawberries and the profits derived from them. I also tell them how to cover them up, and all those necessary points, just as those people here have been talking about since we met together. Then in the afternoon they put me down to talk to the ladies in the cooking school. I am a great hand to have something good to eat, and I like a good cook to get it ready. They send me down to talk to those ladies, but for a person as young as I am it is rather embarrassing, yet I face the music and do the best I can. I tell the ladies they must punch up their husbands in this work, and if I get the ladies interested and they say it must be brought about, things generally go right. This is my part of the work for the first day, except in the evening we hold a kind of an extra meeting, and they sometimes get us to tell some little stories just for the benefit of the city.

Then my next day's work is to talk on apples. I get up the next day, and talk about the cultivation of apples, and the prospect of apples in Minnesota. I tell them what we have done, and what we may expect in future. I try to get every person to set out a few trees, but I do not advise setting them out by the hundred; that is too soon yet. I talk on that subject and they appear well satisfied with my talk.

Then again I must say a word in regard to our books. Now our horticultural works have been lying in the state house. Our friend here has taken the pains of sending these books wherever we have held institutes. You would be surprised to see how hungry the people are for those books. And I will say right here that we have never had one-half enough to go round, yet we have had two hundred to hand round at each session. Now we want a book and we want a medium to get that book to the farmer. There is little use to come here and talk over horticulture from year to year, unless we can make a practice of getting our books into the hands of farmers.

Now while I talk on these subjects our friend, Mr. Gregg, has been very liberal with me regarding time, and has also frequently called me up to discuss the question of forestry planting, which I have done on several occasions, because this thing of seeing men live on the bleak prairie with but one board between them and the north pole, I have a very poor opinion of, (applause) and I recommend planting evergreens round the house, and tell them what they may expect if they do it, and where Mr. Gregg has given me the privilege of talking on this subject, I have never heard such an inquiry for trees as has been made where I have been.

This is the institute work, and it is one of the best works that has ever been accomplished with the farmers, and they are a people that want teaching. (Applause.)

Mr. Thayer:—I would like to ask the gentleman whether he is employed by the Horticultural Society or by the institute proper, and do they allow him to take his time at every session?

Mr. Somerville:—Every time. I am employed by the institute.

Mr. Thayer:—Your people are more generous than ours are in Wisconsin.

Mr. Somerville:—I would say right here, friends, our friend,

Mr. Gregg, is one of the best men to run this thing I ever saw, and when he sees that people are interested in horticulture he will lengthen my time to three-fourths of an hour and cut some one else off.

R. P. Lupton:—I attended the institute at Excelsior and I was very agreeably surprised at the time allowed horticultural subjects.

Pres. Elliot:—I would state that I have been on the institute board for the last three years, and we have been feeling our way very carefully in regard to horticultural work. The time three years ago was all given to the hog, the horse, etc., and you could not get a word in edgewise about horticulture; they did not want to hear anything about that, but the demand now seems to be reaching out toward horticulture, and we have now got to that point where we can have at least one-half hour each session to devote to horticulture, and I am in hopes that the time is coming, as has been suggested, when there will be two institutes at work in our state at the same time. I think this is the true plan for doing this work.

J. O. Barrett:—I want to ask Mr. Somerville what, in his idea, can be done to get our books out. We ought to have them at all our institutes.

Prof. Green:—We have not half enough to go around.

J. O. Barrett:—I receive the books every year, fifty I think. I paid the bill myself one year to get these books distributed. They are very highly appreciated. Some come back to me and express their gratitude for giving them that book.

Pres. Elliot:—There is a plan on foot now, if we can effect it, to issue a hand book on horticulture in connection with our institute work, and we want from fifteen to twenty thousand a year. When we come to hold forty institutes, as we did last year, we can distribute and should have at least twenty thousand books, and take that with forestry and all the different lines of work we are carrying on here it seems to me we would be making pretty fair progress.

L. H. Wilcox:—There are some very important resolutions prepared for the committee on resolutions to act upon, in which this society and the Farmers Institute are very much interested, and I move that Mr. Somerville be appointed to appear before that committee to present this work to their consideration at that time.

Col. J. H. Stevens:—Our institute work is copied from Wisconsin. Wisconsin is the pioneer in that work. Gov. Hoard,

Rusk and my friend Smith inaugurated that work, and I feel proud, although I was not born in Wisconsin, I was brought up there from boyhood, I feel proud of that state and what it has done to favor this institute work. There is no one thing of more importance to the farmer, and of so much benefit, as that very self same institute work, which was inaugurated by Hoard, Rusk and Smith at Menominie.

J. S. Harris: I never like to take sides against Col. Stevens, because we are old Mexican veterans, but Wisconsin got its ideas from Minnesota, because Minnesota had started this work long before there ever was such a thing as institutes in Wisconsin.

Pres. Elliot:—I wish to introduce to you, fellow members, the vice-president of the Wisconsin State Horticultural Society, Mr. M. A. Thayer.

Mr. Thayer then addressed the society as follows:

Mr. Chairman, Ladies and Gentlemen:—I am not here to talk, but I am deeply interested in the farmer institute work, and especially the horticultural part of it. I have been doing some work in that line myself, and I find our people in Wisconsin very much interested in horticulture. We had very large meetings day before yesterday at Lake Mills; we had a room as large as this and it was crowded to the utmost, and on all horticultural topics that came up the people were very deeply interested. Now I came here yesterday for the purpose of getting some information on the subject that you have just had before you. We realize the necessity of getting this horticultural information before the people, also the best way in which we may place our literature before the farmers of the country. In my work in that direction I have prepared a map which I entitled "The Farmer's Quarter Acre." I first lay out my garden four rods wide and one hundred and ten feet long, with the first row for plums and Transcendent crab apples of thirteen trees; the next row I lay out in blackberries; the next in black raspberries; the next in red raspberries; the next in currants, and so on until I complete the garden and have a succession of fruit throughout the season. We recommend what different varieties of fruit should be planted and make the instruction as clear as we can, and after that comes the discussion.

It seems to me that the great need of our horticulturists and farmers in Wisconsin, and I presume it is so in Minnesota, is

organization. It seems to me there should be a good horticultural society in every county, and if it could be, in every town, and if such societies would subscribe for the leading agricultural and horticultural papers, and if they would apply to the different state authorities for their reports, and have other reading matter circulating among the farmers or the members, it would certainly be a great benefit. By organization a great many benefits might be derived. Let me give you one. In an organization of that kind the farmers or others who were determined to plant small fruits for their own use could order their plants for that purpose as a society; they could ask a nurseryman or small fruit dealer to furnish them at thousand rates. They would be glad to do it. I have a price list from eastern nurserymen, from which, to set the quarter acre that I recommend, it would cost \$52.50, while under the plan I proposed any leading nurseryman of your state would furnish that garden for \$12.00, a saving to every individual of \$40.50, and to ten persons who would join in such a society, it would represent a saving of over four hundred dollars. That is only one of the benefits you would receive from organization.

The question of how we can best do the work, or best get this horticultural information before the people is something I want to know, and at our meeting the first week in February we shall try in Wisconsin to devise some means by which that work can best be done, and we would be very glad, indeed, to receive any information on that point from our friends in Minnesota. We also wish to follow you in your plans for legislation, or anything else that may be useful to us. I am here to learn these things at this time. (Applause.)

J. S. Harris:—I want to say that the people in Wisconsin are just as hungry for horticultural information as they are in Minnesota, and I hope that institute will get around and give it to them. I was a short time ago called, expecting to give them a talk on the small fruit garden, but the hog and the horse monopolized the whole thing and I did not get a chance on the floor.

The Committee on Constitution then reported in favor of the adoption of the following amendment to Article III of the constitution:

“Local or county horticultural societies and kindred organizations may become auxiliary to this society by sending three delegates to the annual winter meeting, who shall be entitled to all the rights and privileges of membership upon furnishing

to the secretary of the society a list of members of their society and a report of the proceedings thereof."

On motion of Prof. Green the amendment was adopted.

L. H. Wilcox:—I was perhaps the mover in securing that amendment to the constitution, and I did it believing that we should extend a hand to local societies, and by making their members hold membership in this society, had hoped to see this society largely increased in membership. This is a thing that is very desirable to do. Two years have passed since that amendment was put in the constitution, and outside of a single society, the Beekeepers' Association, which has been formed since that amendment was passed, the outside horticultural societies have not responded to our overtures. I say this simply in explanation, and I have no objection to make to this amendment.

The meeting then adjourned to two o'clock.

AFTERNOON SESSION.

THURSDAY, JAN. 22, 2 P. M.

The meeting was called to order by the president.

President Elliot: We have with us here this afternoon a gentleman who makes a business of raising vegetables for the market in winter. His place is just a little beyond the Washburn Home. I want to introduce to you Mr. Fred Busch.

Mr. Busch then spoke as follows:

Mr. President, Ladies and Gentlemen: Four or five years ago I thought it would be a good thing to raise vegetables in the greenhouse, and as it was rather a doubtful scheme with me I first tried it in one small house. I saw there was an opportunity to make a fair profit out of it, but still I used my hot beds. The next year I built three houses and tried it in that way, and I found I could do it better than with hot beds, and I kept on all that year and the next year I doubled my plant. I now have forty thousand feet under glass. I find there is quite a demand for vegetables, and sometimes I run short. Four or five years ago there were times when I was hardly able to sell lettuce, but now there is a steady demand for it. The crop I raise there at present is almost exclusively lettuce. I intended to raise cabbage this year, but we got the plant finished so late that I did not get at it. This year I made

an attempt to raise spinach, but it was not very successful. I have also tried some onions. I have put in old onions that were considered worthless and got a few barrels, and I think that is something that can be grown very successfully if started in the winter, but still it is a matter of experiment, and as I am only a short time in this special business, I cannot tell how far I shall be successful.

Col. Stevens:—Have you lettuce in market now?

Mr. Busch:—O, yes; we have cut something like seventy thousand heads. Perhaps some of you gentlemen would like to go out there and see what is being done. I should be glad to see you at any time. That is all I have to say. ●

Pres. Elliot:—The electric line runs to Washburn Home, and from that point it is only a short distance to Mr. Busch's place. We are much obliged to Mr. Busch for his remarks.

Mr. Bass is here and has a paper on maple sugar, and unless objection is made we will listen to that now.

Mr. Bass read a paper on:—"Production of Maple Sugar in Minnesota," by J. G. Bass, Hamline, Minn.

President Elliot: We will next proceed to the election of officers.

Sec'y Green: I wish to say that only those have the privilege of voting that are members of this society, as membership in the Bee-keepers Association has been confounded with membership in the Horticultural Society. That membership is entirely different. That was a mistake made at the last meeting.

The following officers were then elected:

President, Wyman Elliot, Minneapolis.

First Vice-President, Clarence Wedge, Albert Lea.

Second Vice-President, Dewain Cook, Windom.

Third Vice-President, L. R. Moyer, Montevideo.

Fourth Vice-President, M. Pearce, Chowen.

Fifth Vice-President, J. O. Barrett, Brown's Valley.

Treasurer, Ditus Day, Farmington.

Secretary, A. W. Latham, Excelsior.

Executive Committee, O. F. Brand, Faribault; J. S. Harris, La Crescent; J. M. Underwood, Lake City; L. H. Wilcox, Hastings; M. Cutler, Sumter.

Entomologist, O. W. Oestlund, Minneapolis.

Librarian, A. W. Latham, Excelsior.

Mr. J. S. Harris then read the following sketch of the life of Mr. A. W. Sias, to the time of his late removal from the state:

Members and friends of the Minnesota State Horticultural Society:

President Elliot has requested me to announce to you that our worthy first vice president, A. W. Sias, of Rochester, has removed from our state to the new state of Colorado, there to make his future home. I have thought that it might be of interest to the younger members of our society to give here a brief biographical sketch of the man who has been so closely identified with the interests of horticulture in our state during the last quarter of a century.

Mr. Sias was born at Derby, Orleans county, Vermont, May 3d, 1838. His youthful days were spent on his father's farm, the old homestead that descended from his grandfather, which was located in the midst of some of the finest views and most beautiful forest and mountain scenes in all New England; and there is no doubt but this scenery and the surroundings of his earlier years, gave him that love for trees which has been a characteristic of his after life, and of late years has been his ruling passion. In the spring of 1851 he accompanied his parents to western New York, where they located on a farm situated in the midst of the greatest nursery district and the then best fruit region in the United States, near the city of Rochester. For a few years he divided his time between assisting a corps of engineers in surveying railroad lines from Rochester to Niagara Falls, and later on the Toledo, Wabash and Western road; attending the Genesee Wesleyan Seminary, and as a traveling agent for the nursery firm of Nelson & Barker, near Rochester. He came to Minnesota in 1859, and for a time made his headquarters at St. Charles, in Winona county. Some time in 1863 he removed to Rochester, Olmsted county, and immediately started the College Hill Nurseries, making a specialty of apple trees and evergreens. I first made his acquaintance at the state fair held at Rochester in October, 1866, where he rendered me valuable assistance in arranging my show of fruits, flowers and vegetables, so that the display should make the most favorable impression upon the many visitors on that occasion. My first impressions of him were that he was a man possessed of sterling integrity and good ability, and from that hour we became fast friends. The objective points I found in his character was that he was too modest and unassuming where only his own interests were concerned, and that he would permit others and less worthy men to push him aside, and step in ahead; and too conscientiously honest to compete with that class of unscrupulous tree venders who at that period were working the tree business for all there was in it, selling unknown auction stocks of trees at 50 cts., \$1.00 and upwards each, while much of his carefully grown stock remained on his hands unsold. I am glad to know that the young man, after long association with me, has to a certain extent been able to overcome this modesty, and is now aggressive and even pugnacious in defending his rights, while his reputation for honesty remains untarnished.

On the morning of October 4th, 1866, when the venerable D. A. Robertson broached the question of organizing a "State Fruit Growers' Association," our friend Sias was one of the first to second the proposition, and with Wm. Somerville, R. S. Cotterell, I. W. Rollins, and several others,

rendered valuable assistance in organizing the society which has become the State Horticultural Society of to-day, and ever since he has remained a steadfast friend and faithful worker in our ranks.

My impression is that he acted as secretary of the preliminary meeting of organization. He has since served the society as treasurer five years and as first vice-president about eleven years and has always been found promptly at the post of duty. He has always been an earnest advocate of the planting of ornamental shade trees, and to-day the city of Rochester owes much of the beauty of its streets, lawns and homestead surroundings to the precepts and example of our worthy friend. At his home on College Hill are growing forty varieties of the pine family and almost every variety of native and foreign deciduous tree that is hardy enough to endure this climate. The grounds have been well kept and the arrangement shows skillful landscape gardening and successful tree planting. Many of the most successful orchards of Southern Minnesota have been planted with trees from his nursery. As an orchardist his work has been largely experimental. His orchard contains over 50 varieties of Russian apples, a still greater number of American and their seedlings, and something like 40 of the Siberians and their hybrids, besides pears, plums and cherries, in numerous varieties. In 1882, 103 varieties produced fruit. What the final result of the experiments carried to completion would have been it is impossible to tell. On August 21st, 1883, the great tornado that swept over Rochester and its vicinity, leaving desolation, ruin and death in its track, uprooted one half of the trees in this promising experimental orchard and left the remainder in a sorry plight. In a moment, as it were, the treasures he had been years in collecting were almost annihilated and the most thorough experimental work that had at that time been undertaken in the state with all its hopes of success was lost or set back for many years and the financial loss to him was one from which he has never fully recovered. Our society has always found him at the front whenever any aggressive work was to be done. We shall miss him in our councils and we hope that he may be most abundantly prospered in his new home, and the horticulturists of Colorado may appreciate his worth.

J. S. HARRIS.

E. H. S. Dartt:—Mr. Harris has stolen the thunder of the obituary committee.

J. S. Harris:—Mr. Sias has been a valuable member. He is a man of sterling worth, and I would like to see resolutions adopted by this society deplored his loss and expressing our good wishes for his future.

The Secretary then read a letter from A. W. Sias, Pueblo, Colorado.

Mr. President, and Members of the Horticultural Society: A residence of thirty-one years in Minnesota, and a small portion of that time happily and profitably spent in convention with you, dating back to your first

meeting at Rochester, in October 1866, all goes to prove to my mind that your mission on earth is a most glorious one, and that your society should be more generally patronized by the good people of Minnesota than it has been in the past. You have been able, and have fairly and squarely proven by many of your most trusty members, that the common apple—"the king of all fruits" can be successfully grown in Minnesota. And what is very important to orchardists, you have shown that apples grown in Minnesota are of a better quality than those grown further south in a milder climate. It has required considerable lung power, as well as a small amount of capital to convince the people of Minnesota that the above conclusions were actual facts, but it is worth to the state all that it has cost, and vastly more. Now that this great question of Minnesota fruit, is settled in our favor, it is much easier for me to tear myself away from this old pet association, that has shown me so many acts of kindness, and courtesies, than it otherwise would have been. We recall to mind how two or three years ago R. C. Keel, of our county, produced about a thousand bushel of fine apples. The croakers then said that it would be his last crop, and his trees would now succumb to the effects of the past severe winters. Well, as good management (not luck) would have it, this year he produced over 2,000 bushels of very fine fruit—better indeed than most anything we could find coming from Michigan or New York. Some may say, perhaps, that he will never be able to produce another such crop, but I can see nothing to hinder him from beating all former records, as his orchard is still young, and he is prepared to add 500 or 1,000 trees to it in the spring. We think it about time for croakers to beat an inglorious retreat. Mr. President, you say that you expect a very full meeting and one of great interest to all horticulturalists in Minnesota. I hope, and trust, that this will be fully realised, and will add that your proceedings will also be of great interest to at least one member in the state of Colorado who happens to be reluctantly absent. You also tell me that initiatory steps will be taken looking to an exhibit of fruits at the Columbian exhibition. I am glad to know this, and hope you will meet with a grand success in the undertaking. Mr. President, please to excuse me from performing the committee work assigned me for the past season, as our time has been so completely taken up of late in moving and in getting settled in our new home in Colorado that we really have had no time to attend to it. Hoping that your sessions may all be pleasant and harmonious, I remain,

Yours very cordially,
A. W. SIAS.

J. O. Barrett:—I have a very little to say. I introduced a question laid upon the table, which I think, perhaps, I had better withdraw. It was in reference to forestry. Our people who live on the open prairie are a great deal interested in raising forest trees, but I have an impression that forestry has been somewhat neglected during this season. I see there is so much on the program that it seems inadvisable to me to bring up this matter, and that it may not encumber the report, I ask the privilege of withdrawing those resolutions.

Prof. Green: I think they should receive consideration, and

it would be a good plan to discuss them now. We shall be short of a paper on celery and it is my idea that we should take these resolutions from the table and discuss them. It will open the way to place them in the hands of the committee.

M. Cutler: We have had no discussion on vegetables, and I should like to hear the subject of celery discussed if we have no paper.

L. R. Moyer: I would like to give a notice. The fourth section of the by-laws provides for several committees, and I wish to give notice, if it is in order, that there should be appointed a committee on ornamental trees and shrubs. I think the reason so few have been planted is because the people do not know what trees can be planted.

Referred to the committee on forestry.

J. O. Barrett: Just a word or two. I am specially interested in this matter, because I represent the people of the open prairie. Now we have, according to the statement of the state geologist, or did have in 1872, ten thousand lakes in our state. These lakes have dwindled down until to-day there are not over one thousand. Our vast territory of woodland has been destroyed and there is remaining now but a small remnant of what it was in 1872. Take it in my own locality: our lake which was originally brim full, has dwindled down so low that we can wade to any part of it. Our locality was so dry this season, on account of the denuding of our forests, that I did not raise but about four bushels of wheat to the acre. The chances of raising crops there are constantly diminishing year after year, and our farmers are much discouraged. Now it seems to me it is impossible for us to raise small fruit, apples and the like, until we commence to restore our forests in Minnesota. The purpose of this resolution is to appoint a committee who shall formulate a bill to be presented to the legislature, and the object of drawing up these resolutions is that all this work may be under the supervision of this society. I am not in favor of having men on the forestry commission that are not adepts in this work; we know more about it than anyone else, and I hope that point will be kept in view, that if anything be done by the legislature that the work assigned to the parties concerned shall be under the supervision of this society.

President Elliot: I wish to call your attention to that green map; part green and part white, the green portion representing the forests and white the prairie.

Col. Stevens: I do not think Minnesota is going to suffer for want of water. Now, if you can grow forests that brings rainfall; they retain the moisture in the ground. A year ago last summer it was my pleasure to travel over a portion of the prairies of Minnesota. Forty years ago I traveled over the same prairie, and except on the banks of the Minnesota river there was no timber. When I went over that country a year ago I was surprised at the timber that was raised by the farmers. Nearly every house had trees on the west side to protect it. Mr. Smith during the last few years has been distributing trees and evergreens all over the state and the result is very encouraging. A friend of mine from west of the Big Woods told me to-day that Mr. Smith's trees nearly all grew. That is very encouraging. Our farmers must be educated to raise forest trees. It is just as much a task to raise forest trees as it is to raise apples. You plant a tree out on the prairie it is going to die if you pay no attention to it. It is useless to plant forest trees and expect them to grow without cultivation. Keep the plow in motion and that will be sufficient to make forest trees grow. I think we need have no fears for Minnesota, but I have some doubts about Dakota, and unless some plan is devised to avoid it, Dakota will go back to what it was forty years ago. You may raise a good wheat crop without rain, but you cannot grow forest trees without rain.

E. H. S. Dartt: It is undoubtedly an unfortunate fact for us that the country is growing dryer and dryer with time. In Wisconsin it commenced to grow dry and it continued to grow dry as long as I staid there. Now the gentleman says we may escape the calamity in Minnesota, but Dakota is going to catch it. Now I think we are catching it in Minnesota every year, and it is those dry, hot winds that come in from the southwest that wither our trees.

M. Cutler: In the northeast we have our greatest extent of water surface, and when our winds are in that direction they are moist and damp usually, and from that direction we invariably get our snow storms, and from the opposite direction we get our hot winds. Now, what injured friend Barrett's wheat crop last year was not the winds from the north, from the pine woods, but the winds from the southwest, from the desert region. Now, the winds that did us the greatest damage last summer were those hot, dry winds.

Dr. Frisselle: It has been said that the cutting away of the forests has caused our lakes and rivers to dry up. I wish to

say that it is no such thing. There is no place in all the world where the evaporation is so great as in the forest. You dig down a little ways in the forest and it is ashes. The rainfall and amount of snow we have is what fills our ponds and streams.

President Elliot: I do not think these resolutions have been disposed of. I think a motion was made to refer them to the committee on forestry, and unless objection is made they will be so referred.

Mr. Latham then read the following paper: Celery on the Prairie, by Sydney Corp, Hammond. (*See Index.*) A discussion then followed.

Mr. Latham read the following papers: "Cultivation of Asparagus," by Wm. Lyons, of Minneapolis. (*See index.*) "Report on Vegetables," by Joshua Allyn, Red Wing, Minn, (*See index.*)

A short discussion followed.

E. H. S. Dartt: I have a resolution here which I would like to have adopted without discussion, if you think best.

"Resolved, That it is the sense of this society that no premiums should be awarded by our State Agricultural Society on fruits not grown by the exhibitor."

The resolution was unanimously adopted.

President Elliot: We have with us here Senator Grafe, of Polk county, and we shall be very glad to hear a few words from him.

Senator Grafe: Mr. Probstfield suggested my coming up here, and I am very glad I came. I am very agreeably disappointed at the grand display of fruits, and also in seeing so many men interested in this work. In my own locality we have become rather discouraged in trying to do anything with fruit. I have become disengaged in trying to do anything with apples of any kind. I am trying to raise some small fruits. I was like a good many other people; my hindsight was better than my foresight. I got my timber belt too close to my house; it is too close to my apple and plum trees. It has not been practicable for farmers to branch out. Of the results of my experiments the last two or three years I cannot say anything. My Transcendents all did very well until the last two or three years they have blighted some. The Hyslop has died out, and as far as apples are concerned I have about given up trying to raise any.

President Elliot: I would like to call on Senator Probstfield, of Moorhead.

Senator R. M. Probstfield: *Mr. President, Ladies and Gentlemen:* I do not know that I can give you any more information than what is in my last report. For the last sixteen years I have been experimenting with apples, and I had good success with Transcendents. I do not suppose I had over forty trees that bore, and I had sixty, fifty and forty-five bushels of apples, and sold them all the way from \$1.50 to \$3.00 per bushel. I did think at one time I would make some cider, but I thought as long as I could get from a dollar and a half to two dollars a bushel for them, I could not afford to make cider. Now I have not got a tree left today. I went to work myself and cut them off two years ago; I think it spoils the looks of a place to leave them standing. I had a lot of trees sent me by Mr. Luedloff, of Carver, nearly all varieties of Russians, and there are quite a number of trees that are very promising. I also had quite a number sent me by Professor Budd, and some from Mr. Sias and Mr. Tuttle. This is not a complete report. I did not have time to make a complete report, and did not have time to find out what was in first class condition and what was not. While I do not expect much from the apples, I think they are doing well enough to spur me on in trying to do the best I can with them on a small scale. I want to say to all those who are making experiments with fruits and trying to do good to their fellow men, keep right on with your experiments. Don't be discouraged if your trees die out. What is half hardy in this locality may not be hardy in our country. I also made the mistake Mr. Grafe did. My timber is too close to my fruit trees. When I first planted I thought they should have shelter, but I had a slope to the northeast and I came to the conclusion that I would set my trees on that slope which had no shelter. Those trees that stood nearest the timber and got the full benefit of the sun and were protected from the wind did not amount to much, while those that were not protected did the best.

Senator H. A. Grafe: I want to say a word about those tree agents. I want to put out the beacon light of warning and I want you to keep it up. I must say that I never got poor stock from any nurseryman that I applied to, but have tried these traveling agents that have had high sounding names for their fruits and I have been swindled abominably every time, but I have not been swindled the last ten years.

President Elliot: We also have with us Senator Orrin Mott, from Lincoln county, from whom we should like to hear a few words.

Senator Orrin Mott: *Mr. President, Ladies and Gentlemen:*—I came here by chance. I am agreeably surprised to see the fine exhibit of flowers, fruit and men that I find here; yes, and ladies too.

I came from way out west, on the Dakota slope toward the Missouri river; and we are suffering under great disadvantages from drouth. I planted some fruit. I commenced four years ago with apple trees of different varieties. These trees all died except a few crabs; they are there still, some of them bearing fruit. I planted a tree claim, and in that I planted a lot of apple trees, quite a number of varieties, but there is none that is doing anything but crabs; they are doing nicely, and are as hardy as oak.

Where I located first I found the premises got so dry I could not get water at all; so I moved from that place to another portion of the farm, where there was plenty of water, and I carried on my experiments of planting fruit trees there. Every tree I planted there has died. They have died since the commencement of this dry season. Even cottonwood trees that I planted last spring have withered and died. I am in hopes, if we get some rain, the people will be able to grow small fruits, but now it is too dry; everything is drying up, and it is very discouraging.

Pres. Elliot: Senator Probstfield comes from Moorhead, way up north. We are very glad that he has not become discouraged, as long as he is able to plant a tree.

Now in regard to the Columbian Exposition, I would like to inquire if anything has been received from Mr. Emery? If not, I would like to have Mr. Underwood, his partner, state something to us in regard to that.

J. M. Underwood: I would say, Mr. President, that I can offer apologies for Mr Emery, and I know you will gladly accept them, as he is sick; not sick abed, but too indisposed to be here. However, he is improving, and was in hopes to be here personally, or send some communication on this subject. I have not received anything from him up to this time; I know, however, that he will be ready to cooperate with the society, and to help to put this matter on a proper basis. Now, we all know how well our efforts have succeeded at New Orleans and Philadelphia, in everything we have done, and all it needs is some energetic and intelligent action to put this matter of the

Columbian exposition in such shape that it will work credit to our society and state. I think it is very proper that this society should recommend that the executive committee should take suitable action in arranging and providing for an exhibit. Some suitable legislation, perhaps, should be asked for, some appropriation on the part of the state, to make a proper display there, and I do not know any better way than to refer this matter to the executive committee, recommending that they give it the necessary and prompt attention. I would make a motion to the effect that it be so referred.

President Elliot: We were in hopes that Mr. Emery would give us some outline or some plan, perhaps, that we could work up, but as we have got a good executive committee, perhaps with their efforts we may be able to bring the matter before our people in such a way that they will become enthusiastic over it. I do not know of any one thing that we as a society can do that will be of more importance to the interest of our state than to place an exhibit of fruit down at Chicago, and in order to do that we have got to have the co-operation of every member of this society and of all auxiliary societies in the state. We must not overlook the fact that thousands and thousands of people will come to that exposition who are looking for homes, and looking for pointers there in order to know where they shall locate, and we should have some kind of literature there that will give them some indication of what our resources are, and we have a little matter in the hands of the committee now in regard to some points that are connected with this. Now in regard to our map, I do not know of anything we could publish that would give better or clearer information than that. We are at work on a fruit map now which, if we can get proper aid to publish it in connection with the book on horticulture, will be of great benefit. It will be distributed all over the state so our farmers may know how to plant and when to plant, and it will be of valuable service to them. There were some recommendations in the president's annual address in regard to this matter, and I would ask that committee if they are ready to report.

Clarence Wedge: Mr. President, as chairman of that committee I would say that Mr. Grimes, the secretary, has prepared a report which meets the approval of the committee.

Mr. Grimes then read the following report:

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Your committee, to whom was referred the president's address, ask leave to make the following report: After giving the matter careful consideration we conclude that the points made are well taken and we have no occasion to critisize or differ in judgment from the wise counsels of our worthy president, whose motto is, to let nothing fail for lack of proper attention. If we could all live up to that standard, we should have less cause to find fault with Providence.

A very important point, and one which demands our first attention, a problem difficult to solve, is how to save the wasted energies of the soil and return an equivalent for the crops which have been taken therefrom. This certainly is worthy of our careful attention, and he who shall master the problem would be one of the greatest benefactors of mankind.

Another, to which our attention is called, is the education of the masses, especially the youth, through the means of the kindergarten and common school work of the farmers institute and especially the more complete and scientific knowledge to be acquired at our agricultural colleges. We shall always want the very best men for the best work, and there is no danger of an over supply. Daniel Webster once said, "there is always room on the top shelf."

In regard to the World's Columbian fair you will probably take some action before you adjourn. As the matter has not yet been acted upon by our legislature we would recommend that the legislative committee of this society be instructed to correspond with the members of the legislature as to the best way and means by which to secure a proper representation.

Another thought is the subject of forestry. Your committee think that Pres. Elliot has laid that matter fairly and squarely before you and it behooves you and indeed every one that has any concern for the future welfare of our land and posterity, to devise some means by which our forests can be preserved at least from open and wanton destruction.

We are also reminded that as a society we shall soon reach the twenty-fifth anniversary of our existence. Our books show that we commenced without any capital, but like most stock companies, we issued bonds and purchased them ourselves and our dividends have been large in experience, and we think that the time has come, as our worthy president suggests, that we should take an inventory of stock, liquidate our floating indebtedness and begin anew upon a broader and more solid basis, in all of which your committee heartily concur.

Signed:

CLARENCE WEDGE,
O. H. WILCOX,
J. T. GRIMES.

On motion the report was adopted and referred to the publication committee.

M. Cutler: I believe Mr. Underwood made a motion.

J. M. Underwood: Mr. Emery, representing the nurserymen and the tree growers at the Columbian Exposition, will do everything in his power to facilitate the working of the executive committee, and undoubtedly will be able to meet with them and will be glad to meet with them to take the necessary steps to make our society prominent in that exhibit. My motion was that this question of the Columbian Exposition be referred to the executive committee with power to act.

M. Cutler: As a member of the executive committee I should like to hear general expression from the members as to how

many are in favor of making a good, grand display at the Exposition.

Senator Probstfield: I believe it would be more proper to find out who is opposed to it, instead of who is in favor. I do not believe there will be any opposition to it. I think the motion made by the gentleman here is the proper one. I think the executive committee is able to handle that matter.

Geo. J. Kellogg: The only thing we are afraid of is that you have got the inside track and are going to beat us.

The matter of a display at the Columbian Exposition was then referred to the executive committee with power to act.

Pres. Elliot: There is another matter in regard to the American Nurserymens Association. The American Nurserymens Association is a body of men representing the whole of the United States. They are the enterprising, progressive, pushing men, who have sent their tree agents so plentifully among us in the past, and they are coming out here to see what kind of a country this is. We rather shut them off with our nursery laws and they want to come here and look around a little and see what there is here. There will be a body of from four to six hundred of them so I am informed. The president of that association, Mr. Emery, of Lake City, wrote to me and wished me to interest myself in behalf of their association in securing a place of meeting for them here next June. They wish to remain here some eight or ten days, in the city and in the state, and they want our society as a society to heartily co-operate with them, and furthermore, they wish us to become honorary members of the association. I will have the secretary read a communication from their secretary.

The secretary then read the following letter from Chas. A. Green, Rochester, N. Y., Secretary of the American Nurserymens Association.

ROCHESTER, N. Y., Jan. 17th 1891.

Minnesota Horticultural Society, Minneapolis, Minn.

GENTLEMEN: President Emery and our executive committee are in favor of making the members of your association honorary members of the American association, for the coming year, their names appearing in our badge book on a page by themselves, so as not to conflict with the numbers of nurserymen. It is understood that the society is to furnish their own badges, if they desire them, you to get up such designs as you deem best; I should not think it would be necessary for them to be numbered at all.

Mr. Emery informs me that you propose to furnish us with the hall, free of charge. Allow me to suggest that our meeting cannot be successful unless the hall is absolutely quiet, and that is very difficult to secure in any city, but this is the main thing to be looked after. Will you kindly write me, stating whether it is possible to get a quiet hall, where the

noise of the street will not make the voice of the speaker indistinctly heard. We anticipate a grand meeting in your city, and shall be very glad to meet you all and get better acquainted.

Yours Respectfully,

CHAS. A. GREEN, Sec'y.

Prof. Green: The idea is that all the members of this society should have a badge to represent them, and in talking this over we thought this society should act as entertainers.

Pres. Elliot: I would say that I have sent a communication to our park board to get them interested, and we are also taking steps to get the chamber of commerce interested, and our mayor here, I think, can be interested in the meeting of this association, and I think there will be no trouble about sending them an invitation, and it will not be of any cost to our society. I think our citizens are public spirited enough to provide for the hall, and I think there will be measures taken soon to do that.

M. Cutler: Is there such a hall that can be obtained here in the city?

President Elliot: I think there will be no trouble in securing a suitable hall, even if we should have to get them to go to the Coliseum. They prefer, however, to have their hall in the immediate vicinity of the hotels.

Wm. Somerville: Do they expect to make an exhibit?

President Elliot: None that I understand.

J. M. Underwood: At their last meeting in New York, their rooms were right in the hotel. They found it very convenient and satisfactory to have quiet rooms in the hotel. Then their members do not become scattered. This is a gathering of nurserymen from all over the United States. They are a wide-awake, enthusiastic body of men, and their meeting will be a very important one. They discuss topics of great interest, and the whole meeting will be a very interesting one. They have auxiliary societies, but the main society is the one that has been mentioned, and I think our members will find pleasure in meeting these nurserymen from all over the United States—Ohio, Illinois, Missouri, Iowa, Wisconsin, in fact, from almost every state in the Union.

Geo. J. Kellogg: Not only from the United States, but from Canada and Europe.

President Elliot: I would suggest that a committee of three be appointed to take this matter in hand and act for the society.

Mr. Cutler made a motion to this effect which was seconded and carried.

The president appointed on that committee J. M. Underwood, C. L. Smith and A. W. Latham.

The society adjourned until 7 o'clock in the evening.

EVENING SESSION.

THURSDAY, JAN. 22, 7 P. M.

President Elliot: I would say in regard to the paper on ornithology, that Dr. Hatch was sick the 21st of October, the time the secretary wrote to him, and soon after his recovery he commenced the preparation of his paper, and we are in hopes he will yet be able to complete it so we will have it for publication.

Secretary Green then read a letter from H. E. Van Deman, Pomologist, Washington, D. C.

WASHINGTON, D. C., January 5, 1891.

Mr. Samuel B. Green, St. Anthony's Park, Minnesota:

DEAR SIR—Your recent favor accompanying the program of the next meeting of your State Horticultural Society has been received lately. It would be a great pleasure to me if I could accept your very kind and urgent invitation to be present on that occasion, but as you presume, it will be impossible for me to do so. I have made three official trips recently, and have another to make soon and my work is so pressing here in the office that it will be impossible for me to leave here on so long a trip as would be necessary in attending your meeting without doing injustice to my work.

Of course I feel it a part of my duty to visit your state and I shall certainly do so on the first possible occasion. It may perhaps be best for me to attend one of your summer meetings and see the small fruits and such things in the summer. My present plan is to go there next June or July.

As to a paper, I am absolutely unable to prepare it, owing to the great amount of work to do here, and the serious illness of my first assistant. Wishing you and the society abundant prosperity, I am

Very respectfully,

H. E. VAN DEMAN, Pomologist.

The secretary also read a communication from Frank Burnett, of Belmont, Man.

BELMONT, MAN., January 16, 1891.

Professor Green, Secretary Minnesota State Horticultural Society, St. Anthony Park, Minn.

MY DEAR SIR:—I have been looking forward to again having the pleasure of being in attendance at the annual meeting to be held on January 20, but, unfortunately, press of business will prevent me from being there. If I had anticipated this I should have endeavored to have given my experiences in the horticultural line during the past season, but it is too late to attempt a paper on the subject. I may say, however, that on the whole they have been satisfactory and encouraging. For instance I think I may claim the credit of being the first who has succeeded in fruiting anything in the shape of a plum in Manitoba, outside of our wild varieties. My De Sotos fruited this season and ripened in good shape. As regards hardiness they without exception open this spring from the terminal buds.

Trusting that the meeting may be well attended and that the proceedings may in a large measure be conducive to the advancement of horticultural interests.

I am yours truly,

FRANK BURNETT.

The Cecilian Quartette then favored the society with a vocal selection, entitled "My Rose."

Prof. C. H. Hall, of the State University, read a very interesting paper, entitled "Geological Formations as Related to Plant Growth." (*On account of frequent reference to a series of maps it is found impracticable to publish this paper.*)

On motion of Mr. Barrett, a vote of thanks was tendered Prof. Hall for his very able paper,

Miss Gertie Hooker, of Minneapolis, very kindly entertained the audience with a recitation, entitled "Johnnie Appleseed."

Prof. McMillan, of the State University, read the following paper; "Diseases of Fruit." (*This paper is not published, as continual reference to charts would render it unintelligible without them.*)

President Elliot: We thank the professor very much for his valuable paper.

Prof. Pendergast has something to say I believe.

Prof. Pendergast: Professor Green has asked me for two selections, and he also asked me if I would write a few words about the buckthorn hedge. I do not know what you mean to call for now. Now professor, what do you want, the selection or the article on the buckthorn?

Prof. Green: You know well enough what I want. .

Prof. Pendergast then read a selection entitled "How Ruby Played," which was very highly appreciated by the audience.

Prof. Lugger, of the State Univessity, read the following paper:

Insects Injurious to Fruit Trees. By Prof. Otto Lugger, St. Anthony Park, Minn. (*See index.*)

President Elliot: Is there any question you wish to ask Prof. Lugger in regard to points brought out in this paper?

This is the last paper of the evening, and I would say that the executive committee is in session in the other room, and if anyone has a matter to present to them, if they will make it known it will be considered.

Prof. Pendergast, being called on for his article on the buckthorn, read the following: "The Buckthorn," by Prof. W. W. Pendergast, Hutchinson, Minn. (*See index.*)

This closing the business of the evening, the meeting adjourned to Friday morning at 9 o'clock.

FRIDAY MORNING SESSION.

JANUARY 23, 9 A. M.

The meeting was called to order by the president.

President Elliott: We have with us here today Prof. C. B. Waldron, or the North Dakota Agricultural College, of Fargo, who has prepared a report on wild fruits which he will now read.

Prof. Waldron: There is no report about it. I cannot tell you people of Minnesota anything new in regard to wild fruits. You have about the same as we have, only I want to show you that we are as well off as you are.

Prof. Waldron read the following paper: "Fruits of North Dakota," by Prof. C. B. Waldron, Fargo, N. D. (*See index.*)

A short discussion followed.

Pres. Elliot:—We have some resolutions that Prof. Green will read.

Prof. Green then read the following resolutions inviting the American Nurserymens Association to Minneapolis:

Resolved, That we, the members of the Minnesota State Horticultural Society, hereby extend to the American Nurserymens Association a cordial invitation to hold their next annual convention in the city of Minneapolis, and pledge the best efforts of our society to make the meeting a pleasant and entertaining one.

Resolved, That a committee of twenty-five from this society be appointed to act as a reception committee to act with representatives of the city council, park board and other organizations to make the necessary arrangements for the above meeting.

On motion the resolutions were adopted.

The president then appointed J. M. Underwood, C. L. Smith and A. W. Latham a committee to consider the subject of this resolution and to recommend twenty-five members to be appointed as delegates.

Pres. Elliot: Ladies and gentlemen, I have the pleasure of introducing to you the Mayor of Minneapolis, Mr. F. G. Winston. He will now address a few words to you.

Mayor Winston: Mr. President and gentlemen of the State Horticultural Society: I did not come in here this morning to address you, but I came here to pay my respects to your society and to see the fruits you have on exhibition. I do not believe I could talk on the subject of horticulture; I am not familiar with the business. Anything in the agricultural line, like cattle, horses, corn, wheat or potatoes, I am more familiar with. Having been born and raised on the farm, I know some-

thing about it, but very little about raising fruit, except the way the farmers raise it, plant a tree and trust it to take care of itself. I have tried that plan, but it does not work very well. I am glad to see you gentlemen so much interested in raising fruit, especially in this state, and I am glad to see the progress made in this direction. In your meetings annually I suppose you exchange ideas, go back home with new plans and come back next season to show the results of your experience. I understand there is to be a meeting of the American Nurserymens Association in this city, and I have been requested by the park board to confer with your president with a view to entertaining these gentlemen when they come here, and I shall take pleasure in doing all I can to make it pleasant and agreeable for them while in the city of Minneapolis. Ladies and gentlemen, I thank you. (Applause.)

Pres. Elliot: We have just passed a set of resolutions inviting them to come to Minneapolis, and providing for the appointment of a committee of twenty-five from our society to act as entertainers with a like committee from the city. We have a paper that we have passed on forestry. It is by Mr. Chas. Luedloff, and we had to have it translated, and have no time to take it up to-day, but I would suggest that it be referred to the publication committee to revise and put into our record. It will be so referred unless objection is made.

The committees on awarding of premiums then presented their reports. (*See index.*)

Pres. Elliot: The treasurer is ready at any time to pay off these awards whenever you find him.

The following paper was then read: "Elementary Principles of Manuring," by Prof. Samuel B. Green, St. Anthony Park, Minn. (*See index.*)

A very interesting discussion ensued upon the reading.

Pres. Elliot: If there is no further discussion on this subject we will take up the next topic on the program, which is a paper by Prof. Hayes.

Prof. Hayes: Prof. Green asked me to prepare a paper on the relation of horticulture to agriculture, but in connection with our maps here I want to say a little about our winds and what they are doing for our farmers.

Prof. Hayes then read the following paper: "Relation of Horticulture to Agriculture," by Prof. W. M. Hayes, St. Anthony Park, Minn. (*See index.*)

Pres. Elliot: If there is no discussion, we will next have a paper by Mr. Wedge.

Mr. Wedge responded with the following: "Horticulture on the Farm," by Clarence Wedge, Albert Lea, Minn. (*See index.*)

The reading was followed by a discussion of the paper.

Pres. Elliot: I want to make this proposition to you. We have now reached the end of our program this morning, except the question box is yet to be considered, and if we stay right here for an hour and a half we can get through so we can go out to Mr. Mendenhall's, also to Mr. Busch's place; one growing flowers and the other vegetables, and I think the friends will be exceedingly well pleased with the trip. When we made up the program we had nothing of that kind in view, but I have been talking with some of the members and they would very much like to make the trip.

J. S. Harris: It strikes me we might hold an evening session.

E. H. S. Dartt: It occurs to me that the most important work of the session is now before us, and I would rather go on with the business than go on a junket. We have yet to hear the reports from the experiment stations and I think all the members should hear those reports and they should be discussed. Now I have a report that I want to present, and I want it discussed, and I want some instruction from the society, and if you leave those reports you leave the most important work of the session.

Pres. Elliot: The most important thing we have on hand now is the reports from experiment stations, and I have been talking with Secretary Green and we thought we could take up those reports now and dispose of them.

E. H. S. Dartt: It has been my opinion always that experiment stations were of little value unless the work was recorded, and I have secured the printing of one thousand copies, and will distribute them as far as I am able to those whom they will do the most good. I believe in getting to the attention of the people anything that will be of benefit to them.

Mr. Dartt then read the following report: "Report from Owatonna Experiment Station," by E. H. S. Dartt, Owatonna, Minn. (*See index.*)

Pres. Elliot: Mr. Benner, the president of the Minnesota Poultry Association, is here and would like to say a few words to you

Franklin Benner: Ladies and Gentlemen: In order to give you an opportunity to study the trees which produce this fruit we propose to hold an exhibition at 128 Washington Avenue North. Through the liberality of our business men here we have the best premium list of any ever offered in the state. I think it is ten years since we had an exhibition in Minneapolis. I hope all of you that have poultry will bring it and show it, and we will be very glad to give a premium to those who deserve one. If any of you have friends who are raising poultry we would be very glad to give them our premium list. I will leave sixty here, and if any of you wish any more I will gladly furnish them. We have issued seventeen hundred copies and wish them freely distributed. I give you all a cordial invitation to attend.

Prof. Green read the following report: "Report from Central Experiment Station," by Prof. Samuel B. Green, St. Anthony Park, Minn. (*See index.*)

President Elliot: If there is anything in either one of these reports that needs discussion, I hope you will take it up.

L. H. Wilcox: I am so happy to agree with my friend, Prof. Green, for once, that I move they be referred to the executive committee without recommendation.

The reports were so referred. A short discussion then followed, on the report of E. H. S. Dartt.

The following reports were then read: "La Crescent Experiment Station," by J. S. Harris, La Crescent. (*See index.*) "New Ulm Experimental Station," by C. W. H. Heideman, New Ulm. (*See index.*)

J. S. Harris: It is proposed by this society to cut the experimental stations down to seven, and I may not be among the lucky or unlucky seven, but I shall continue the experiments, just the same, as I am very deeply interested in getting together all the native plums of the northwest, and I want to extend an invitation to you, and that is, that every man who has a good quality of native plums, or one that he esteems more than another, would correspond with me, and if he can do so, send me a root plant of the variety, and anything I see that is desirable, I will respect the owner's rights. I do not want them for sale, but am only interested in getting them together and having them proved, so that out of the whole number we get a profitable variety. Also in regard to seedling apples I would make the same request.

The secretary read the following report: "Minnesota City Experiment Station," by O. M. Lord. (*See index.*)

President Elliot: If all the friends will come forward we will decide what we are going to do this afternoon. I would like to know how many there are who can stay to an evening session. We can do one of two things,—visit Mr. Mendenhall's greenhouses and Mr. Busch's place, and finish up this evening, or we can forego the pleasure of going out there, and finish up now.

J. S. Harris: I believe we should not forego such a treat, and we should come back here this evening. I am in favor of having an evening session.

J. O. Barrett: The committee on forestry wants some points before they are able to report. We had a session this forenoon and came to this conclusion: That the wisest course for us to take is to resurrect the Forestry Association. Our reason for coming to this conclusion is that there is so much business on hand at our annual meeting, covering so large a territory and increasing every year, that it is impossible to give forestry the attention it deserves and requires. Now, under the circumstances, we would like to recommend as a committee, that we reconstruct the Forestry Association, and with the understanding that we co-operate just as earnestly with this body as before. Now, as our president has recommended, either the Forestry Association must be suspended or it must be reconstructed. We are not disposed to act unless this society will approve. Such is the conclusion we have come to, and we think it is the wisest course.

J. S. Harris: I suggest it would be better to have the Forestry Association reconstructed, put upon a firm basis, come together every year and do such work as we are doing here now. I do not mean to find any fault with what was done, but I would rather have five hundred dollars expended in getting up a meeting to learn the wants and views of foresters than to have twenty thousand expended in any other way. As far as the work goes it is good, but the experience of men, and the wants of men and the ideas they get in coming together here will do more in one year for reforestation than ten or fifteen years of any other course.

Prof. Green: I rather think the subject of forestry is of such great importance that it should be considered apart from horticulture, and I would like to see this Forestry Association reconstructed, and upon a firm basis, and take steps to have

the next national convention held in Minneapolis, and I think in that way a sentiment can be worked up that will do some good.

Pres. Elliot: So far as I am concerned I am heartily in favor of the Forestry Association being reconstructed, but I am not in favor of our society going ahead and doing the work, as we have been doing it, taking it up piecemeal, and if the Forestry Association will come forward and do the work as they ought, the Horticultural Society will drop that work entirely and turn their attention to something else just as important, and we will most heartily work in connection with the Forestry Association.

Mr. C. L. Smith then read the report of the committee on final resolutions.

Resolved, That we hereby express our hearty approval and appreciation of the work of the U. S. Agricultural Department in collecting information regarding the fruits of the Northwest.

Resolved, That our thanks are hereby tendered the "Cecilian Quartette" for their contribution to our entertainment.

Resolved, That our thanks and hearty appreciation are hereby expressed to the florists of the city for the large and beautiful floral display that has contributed so much to the pleasure and interest of this meeting.

Resolved, That our thanks be given the fruit and vegetable exhibitors for their liberal and excellent exhibit.

Resolved, That the thanks of the members of the Minnesota State Horticultural Society are hereby tendered to the Guaranty Loan Company for their courtesy and generosity in furnishing us an elegant hall warmed and lighted free of charge.

Resolved, That our thanks are returned to the Chicago, Milwaukee & St. Paul, Chicago & Kansas City, Minneapolis & St. Louis, Chicago & Northwestern, the Burlington, St. Paul & Duluth, and Soo Railroads for reduced rates to delegates.

Resolved, That our thanks are returned to the press of the city for their fair and liberal reports of our proceedings.

Respectfully submitted,

C. L. SMITH,
A. W. LATHAM,
CLARENCE WEDGE,
Committee.

On motion the report was adopted.

C. L. Smith: Mr. President, we have with us Mr. Kellogg and Mr. Thayer of Wisconsin; you all know them. We also have Mr. Gaylord of Iowa. We also have a new face here, Prof. Waldron, of the North Dakota Agricultural College, and I move that these gentlemen be made honorary members of this society for five years.

The motion was seconded and carried.

Mr. Thayer: I wish to state that I have got the best thing. I paid my dollar to the secretary and I am one of your members, entitled to all the rights and privileges.

President Elliot: I think Mr. Thayer was too smart for us.

Now we will adjourn to two o'clock; then we will decide what we will do this afternoon.

The meeting was then adjourned to two o'clock P. M.

FRIDAY AFTERNOON SESSION.

JAN. 23, 2 P. M.

The meeting was called to order by President Elliot.

Secretary Green read the following report: "Carver Experiment Station," by Chas. Leudloff, Carver, Minn. (*See index.*)

The following report was also read: "Report of Willows and Poplars," by L. R. Moyer, Montivedo, Minn. (*See index.*)

Pres. Elliot: If there are no questions to be asked on those reports we will take up the question box.

QUESTION BOX.

(*These questions and answers will be found arranged under the topics where they belong.*)

Pres. Elliot: Here is a letter from our auditor of state, Mr Braden, which the secretary will read.

Prof. Green then read the following communication:

ST. PAUL, September 23, 1890.

Mr. Wyman Elliot, Pres. State Horticultural Society, Minneapolis, Minn.

DEAR SIR: Some two or three years ago, as you are aware, my attention was called to the fact that your society had offered a premium for the propagation of certain hardy varieties of winter apples and were setting apart a portion of the yearly appropriation, accumulating a fund for the purpose of paying such premium whenever the fruits designated should be produced and their hardihood and adaptability to our climate demonstrated. This accumulation, it seemed to me, was not in accord with the spirit of the law and on referring the matter to General Hahn, he endorsed my view. I stated to your society that the better way would be to allow that money to remain here in possession of the state, and should any person succeed in propagating such fruits and become entitled to the premium, that the money would be retained here subject to the order of the society for such purpose.

I write this letter at this time, on the eve of my departure from this office that you may hold it in your society's archives to be presented to my successor, in order that he may know what was the intention of the office at the time the reserve of the fund was made.

Yours truly,

W. H. BRADEN, Auditor.

President Elliot: A committee went to St. Paul, waited upon the State Auditor, and after talking the matter over he wrote that letter to me, and wished me to put it in our report; so the letter will be turned over to our publication committee.

In regard to the committee on legislation, of which I am chairman: Now we have not done anything in the way of legislation the past year. We thought we could get better results by keeping quiet. We asked for no appropriations; we thought we would be doing better service than if we asked for an appropriation, and we have nothing further to report so far as legislation is concerned. The executive committee has the appointment of the next committee on legislation and so all matters will be referred to that committee.

M. Cutler: There is another matter that should be looked after, and that is the printing of our reports should be placed in the hands of the society, and it should be fixed so they can have the printing done wherever they can do the best, and we could have that part of the appropriation placed in our hands. The principal reason is that this printing is in the hands of the state printer, and in connection with legislative work they cannot do our printing until sometime in the summer, and when the legislature is in session our reports do not come out till summer or fall. Now if this was placed in our hands the printing would be done by some firm and the report would be out sooner.

On motion of Mr. Wilcox the whole matter was referred to the legislative committee with power to act.

Secretary Green read a letter from the Goodhue County Farmers' Association, extending an invitation to the society to hold its next annual meeting at Red Wing.

Mrs. Jennie Stager: Mr. President, we should like to have the summer meeting of the society held at St. Cloud. I live near St. Cloud and I would like to have you come there. I can put six or seven in my house, and if we could not find places for the rest I could put up tents on the lawn. There is not much fruit grown there except what I grow, and I think it would give our people a stimulus to grow more of it.

On motion of Secretary Green the executive committee was appointed a special committee to consider the matter of the next place of meeting of the society.

Prof. Green: I wish to say that the American Nurserymen's Association holds its meeting here about the 10th of June,

which is some time previous to the time we usually hold our summer meeting, but it seems to me it would be a good plan to hold our summer meeting the same time.

Mr. Harris offered the following resolution, which was adopted:

Resolved, That the salaries of the officers of this society for the ensuing year be as follows: President, \$25, secretary \$500, treasurer \$25, librarian \$10, and that the actual expenses of the executive committee in attendance on meetings when called together shall be paid.

Pres. Elliot: The committee on fruit list recommends the Duchess, Hibernal, Tetofsky and Peach as apples for general cultivation. On motion the Peach was taken off the list.

Prof. Green: President Elliot and myself were put on a committee to get up a fruit map of the state. We have considered the matter at some considerable length, and we have decided it is a good thing to do. I would suggest that this map also contain other features of the state. I would also say that this committee has found a way by which this map may be published at no expense to the society.

On motion the report was accepted and the committee discontinued.

C. L. Smith: The committee on Nurserymens Convention would like to report in favor of all the members of this society acting as delegates, and reporting to the secretary if they will be present.

President Elliot: It is understood that the committee on American Nurserymens Association desires all members to act as a committee of representation, and they will be furnished with badges if they will give their names to the secretary, notifying him that they will be present on that occasion.

All papers that have been presented will be put in the hands of the publication committee and will appear in our annual report.

On motion of Judge Moyer the society adjourned *sine die*.

HORTICULTURE.

WOMEN AS HORTICULTURISTS.

BY MRS. A. A. KENNEDY, HUTCHINSON.

If it be necessary for a woman to work to earn a livelihood, there is no work she can engage in that is more healthful, more pleasant or more remunerative than horticulture.

It not only fills our tables with luscious fruit but supplies our pockets with shining silver.

In the garden she can find ample scope for her ingenuity and skill, of which most women have a plenty, if they are placed in a position to bring it out. When we talk of gardening, it looks very simple. Why, I verily thought, when I visited Mr. Baldwin's garden and saw what he was doing in this line of work, and what he had accomplished, that I could make my fortune in a very short time. But after six years of hard labor I have learned this much—that I knew nothing. There is something more required of us than simply to sow the seed and pluck the fruit. O, what a study this is! Some of my friends call me a horticultural enthusiast, but this I know: The more I study nature, the more I comprehend what heights there are to scale, what depths there are to penetrate, what breadths there are to compass, the more enthusiastic I become.

It was force of circumstances that first led me to take lessons in this particular branch of industry. You know it is an old saying "pigs must root or die," and as it was necessary I should do something to avert this dreadful calamity, I could think of nothing else that would pay as well as rooting—plants. But it was not long ere I learned to love this occupation. It aroused faculties that had hitherto lain dormant; that I did not know or realize that I possessed. In studying nature we become more intimately acquainted with nature's God, and at every step as we advance new beauties unfold until we become lost in wonder and admiration at the attributes of this Great Being, whose greatness fills immensity, and whose handiwork we can trace in the minutest particles of soil, in the tiniest bud, in the full grown leaf, in the fully developed fruit, in the ripening wood, in the withering leaf, and in the restful attitude they assume preparatory to a reawakening on the resurrection morn, when they will come forth invigorated with new life, thus showing forth the wisdom of this all-wise Being.

But I have found the horticulturist is not always carried "on flowery beds of ease" to success, but, like all other mortals, they have their trials but there are so many sweets to one bitter that we can well afford to put up with all the unpleasantness for the enjoyment we get. If I were worth my thousands I would still be a horticulturist, and strive to make it a success. I want to do a little better than Moses did; I shall not be satisfied with getting a glimpse of the "land where they raise such large fruit," but shall try to press onward and upward till I can raise them myself—perhaps not as large as the spies found—but intend to come just as near it as I can.

RELATION OF HORTICULTURE TO AGRICULTURE.

BY PROF. W. M. HAYS, ST. ANTHONY PARK, MINN.

In our agricultural schools and newspapers we make a clearer distinction between the terms agriculture and horticulture than could be found in dictionaries. In its broader sense the term agriculture covers the entire range of farm business. In a narrower sense it covers all that pertains to live stock husbandry, in all its manifold divisions, including the production of feeding stuffs, the raising of field crops, and the art of cultivation in so far as it applies to these larger field crops. Horticulture, on the other hand, is sometimes used to designate all the art of cultivation outdoors and in, but in its ordinary use it applies principally to the orchard, the garden, the greenhouse, the forests, and to beautifying the landscape. When thus viewed separately we have two wonderful lines of industry associated most intimately, though each branches out into its own special lines, and in their extremes they seem very far apart. Growing roses under glass, for example, is far removed from wheat raising or the production of ranch cattle. The agriculturist and the horticulturist, be he practical only or professional, needs a knowledge of chemistry, physics, botany, entomology and many of the other sciences, if he would best be able to solve the innumerable problems constantly confronting the observant mind. Both alike need to know the science and art of keeping up the fertility of the land, of cultivation, of drainage, etc.

In our great state agriculture, as above defined, is the source of the greater production of food. Its principles apply to far more of the industry of the state. Through it we get the bread and meat and the larger part of the dollars wherewith to procure raiment, to build houses and provide other necessaries and comforts. Horticulture gives us the sauce to go with our hog and hominy rations; and it gives a most respectably increasing part of our food and ready cash as well. As an art and science, if you please, it is filled with detail more than agriculture. While its principles may not cover as wide a range of operation, it includes a greater variety of materials and processes. Horticulture follows with its nicer cultivation after the frontier agriculturist has tried to spread himself over the earth trying to farm "all outdoors." In a new country horticulture is a weakling which merely stands while the wheat craze is on top, and thrives when poor crops and poor prices force the farmer to raise his vegetables, berries and larger fruits. It thrives to protect by means of groves the stock that necessity compels the farmer to raise in a more diversified system of husbandry.

Horticulturists in a new country are truly missionaries. They best master the underlying principles of farming and illustrate to their neighbor agriculturists how to better concentrate, how to prepare and use fertilizers—how to look out for the details of agriculture.

Time permits only reference to the intellectual, moral, as well as substantial benefits arising to our farmers from their cultivation of flowers, gardens and trees. The stimulus to general intelligence among our farmers which is exerted by getting them interested in studying the laws of plant growth and allied subjects related to the real things they have in hand is very great. The more horticulture we have the more will our farmers be drawn in contact with each other, to be profited by association

and discussion. Horticulture has such a recognized moral influence that homes are not considered complete without trees and flowers and a naturally developed love for them. Farm boys, for example, will not be nearly as liable to wander and drift into bad paths if they are brought up under the influence of homes which have been properly laid out and gradually developed, into which the coldest winds can not reach, where sunshine has full power to develop all upon which it may fall. The young man who can leave a home surrounded by a neat lawn, decorated with flowers and protected and made beautiful by trees as he passes out into the untried world, without deep emotion and strong resolutions to build well his own fortune, is very rare. The immediate substantial benefits of farm horticulture to the farmer are many: In health, in saving of bills for food, in lumber or wood, in doctors' bills, and last but not least, in comfort.

But the question most needing discussion is the relation of forests to climate and how agriculture is assisted by the presence of a large percentage of forest-planted lands in all farming regions.

MANURING.

ELEMENTARY PRINCIPLES OF MANURING,

BY PROF. SAMUEL B. GREEN, STATE AGRICULTURAL COLLEGE.

It is very difficult to define in a few lines and in exact language, the full significance of the term manure. Its etymological meaning is from *main*, hand and *ouvrir*, to work. Originally manuring was regarded as the working of the land, by which the soil was exposed to the action of the atmosphere, and plant food was produced from the insoluble food already in the land.

Perhaps Joseph Harris' definition of a manure is as complete as any, i. e.: "Manure is anything containing an element or the elements of plants, which, if the soil needed it, would, if supplied in sufficient quantity and in an available condition, produce according to soil, season, climate and variety, a maximum crop."

WHAT THE PLANT NEEDS.

Having thus defined manure, let us glance at the plant and its needs. Plant growth may be defined as the transformation of inorganic into organic substances.

All plants require certain elements for their growth, but not all in the same proportion. The combustible parts of agricultural plants contain the elements, nitrogen, oxygen, hydrogen, carbon; and these with the exception of the nitrogen in some plants is all received from the atmosphere—practically then, all the heat producing parts of all fuel and of all plants comes from the air.

The ash of agricultural plants contains lime, potash, soda, phosphoric acid, chlorine, silica, iron and sulphur—these elements are the non-combustible parts and are received by the plants entirely from the soil.

The materials which *all* agricultural plants obtain from the air are to be had in abundance, and are not the necessary constituents of a perfect manure. But all plants do not have the power of taking nitrogen from the air, and because many soils do not contain it in sufficient quantity for plant growth, it is generally a necessity in perfect manure, and is the only one of the combustible elements that is, commonly speaking, a manure. In other words the addition of the others, would not, in any known instance, be followed by increased crops.

The material which plants obtain from the land are present in most agricultural soils in abundance. Lime, silica, chlorine, soda, iron and sulphur are seldom if ever necessary in a manure. If elements are lacking in the ash of soils, they are, almost without exception, either potash or phosphoric acid and sometimes magnesia. We find therefore practically, that a complete manure for any soil must contain nitrogen, potash and phosphoric acid and sometimes, though very seldom, magnesia.

SOILS.

Soils vary much in composition and of course are made up of the material from the rocks which by disintegration have formed them. They have most of the necessary elements in abundance. Soils from feldspathic rocks are especially rich in potash while those from apatitic rocks are especially rich in phosphoric acid. Again many soils contain much carbonaceous matter (humus), which of itself is not a plant food, but acts physically in the soil to promote the best condition for plant growth. It retains moisture and by its decomposition throws off carbonic acid and starts chemical action in the soil, by which plant food is set free. It is largely present in stable manure.

The elements of the soil act one upon the other, in connection with the atmosphere, so that in point of fact the soil is like a great chemical laboratory, in which some plant food is being formed and some small amounts are becoming inert all the time. The amount of plant food set loose each year undoubtedly varies greatly. It has been estimated that after a New England pasture once becomes so exhausted that it will only produce green moss, that it will take thirty years of nature's care to restore it to its original fertility.

In experiments on a stiff chalk clay in England for thirty years, it has been found possible by extended cultivation and working of the soil to produce an average of 15 bushels of wheat per acre without any manure whatever, which would show that sufficient plant food was set free in an acre each year in that particular soil to produce that much wheat each year.

CHEMICAL ANALYSIS OF THE SOIL.

Not many years ago it was claimed by a class of agriculturists that a chemical examination of the soil would show what was lacking and that when it was found out, the thing to do was to add that element only. Without going into the reasons, I will say that this has proved of but little practical value. There may be an immense amount of plant food in the soil, but the plant may starve for it, because it may be in an insoluble form. A plant may starve for phosphoric acid in a soil composed of ground apatite, or for nitrogen when immense amounts are present in

the form of leather scrap. But chemical analysis has done much for the science of manuring and is a great aid to the development of special fertilization of crops, but especially by the study of the crops themselves, rather than the soil.

MANURIAL VALUE OF A CROP OF CORN.

The manurial values of different crops varies greatly, but the constituents of plants of the same natural order are about the same. For an example I will mention corn. A crop of 60 bushels of Indian corn would proportionately have about 6,000 pounds of dry stalks, cobs and leaves. The whole crop would remove from the land 76 pounds nitrogen, 38 pounds potash, 41 pounds phosphoric acid, besides a large quantity of silica and magnesia, and smaller quantities of soda, sulphur and iron; these must be present in the soil, while practically all the rest of the crop comes from the atmosphere.

It has been often claimed that if the material contained in the twenty bushels of corn is known, then it is only necessary to apply just that amount of material and get the twenty bushels increase. In some experiments tried this has proven true, but in ordinary practical work it is not of much value for several reasons:

1st. The material must be supplied in a known quantity and in a soluble form. This is quite impossible under ordinary circumstances, for in the application of home made manure we can not calculate exactly.

2d. There are limits to production due to drought, or to too much water, which may hinder chemical action and the consequent forming of plant food.

3d. Some plants have a much greater power of obtaining their food from soils than others, and by chemical analysis of the plant we can not tell anything about this power, nor how much of the nitrogen present comes from the soil, nor how much from the air.

It may be of interest to note how much valuable manurial material is contained in a load of average manure; calling a wagon load one ton it would contain 1,323 lbs. water, 111 lbs. ash and 13 lbs. nitrogen. The ash would contain 24 lbs. potash and 7 lbs. phosphoric acid, and in this connection it should be understood that all of this material is not plant food that is available to plants the first year, but much of it is insoluble and only becomes plant food perhaps after several years.

DEFINITIONS.

Nitrogen. This is found in nature as a gas in the atmosphere we breathe, where it is combined with oxygen in the proportion of seven parts nitrogen to one oxygen. We meet it in nitric acid, in ammonia, saltpeter, etc. It enters largely into such foods as eggs, lean meat, cheese, etc., where it is largely the muscle-forming portion.

Phosphoric acid is a combination of phosphorous, oxygen and hydrogen. It forms in combination with lime almost all the bony framework of our bodies.

Potash is an alkali, and is met with under many familiar forms. The potash of commerce is a combination of it with oxygen. In its metallic state it cannot be kept in the presence of oxygen.

Agricultural plants can be divided into nitrogen increasers and nitro-

gen consumers, and a thorough knowledge of each class is necessary for the most economical manuring of crops.

Nitrogen increasers are all found in the great natural order *Leguminoiseæ*, and are represented by clover, peas, beans, alfalfa, &c. These plants have the power of taking nitrogen from the air through their roots, and consequently leave the soil richer for having grown there. They are used as gatherers of nitrogen for other crops. The chemical analysis of clover shows that it contains a large quantity of nitrogen, but it would be a waste of nitrogen under ordinary conditions to apply it for this crop while for a crop of wheat which contains relatively a much smaller amount of nitrogen it would be a very necessary constituent. For very many years it has been known that clover was an improver of soils and all of our national systems of rotation of crops included it as a most important factor, but it is only within a few years that we have learned that nitrogen was obtained by clover by the action of bacteria in the tubercles of the roots. Leguminous crops then, may be used as gatherers of nitrogen for other crops which have not the power to take this element from the atmosphere.

By nitrogen consumers is meant all our agricultural plants other than the legumes. These plants are dependent for their nitrogen on the supply of this material available in the soil, so that while they do not hold in their mature structures so much nitrogen as the legumes, yet they require more nitrogen in the soil. It is an old saying that "It is poor land that will not grow white beans." And this is accounted for by the fact that white beans, which is a legume, have a far greater power than most agricultural crops of gathering nitrogen, which is more apt to be wanting in sterile soil than any other constituents of the crop.

The action of manures can be and is generally both direct and indirect. They act directly when they contain actual available plant food or when by their decay they yield the same. They act indirectly when they start chemical action in the soil, and set free soluble plant food. Almost all manures act in this way. Stable manure by its decomposition, which is chemical action in the soil has been known to increase the temperature of the latter by three degrees. Lime in itself is a plant food and is largely used by some crops. Most soils contain it in great abundance, yet if quick lime be added to a soil already rich in lime stone, in a soluble form, it generally serves to increase the growth, which is not due to the plant taking up more lime but rather to the fact that the caustic lime starts chemical action in the soil by which some of the locked up, stores of plant food are made available. The same may be said of unleached wood ashes, though it is a much more valuable fertilizing material than lime.

For my present purpose manures may be classed as commercial and home made. This is an arbitrary distinction so far as scientific classification goes, but it is a division which every practical farmer has, or soon will have, to consider.

COMMERCIAL MANURES.

At the present time the farmers of this state have no need to buy much if any of the so-called commercial manures, for if any farm in the state is put under a systematic rotation of crops, and with a careful husbanding

of its manorial resources, it has all the necessary manures for successful farming or fruit growing. But under this head it may be well to mention the following fertilizers, which are cheap and most of them products of our manufacturing interests. They can sometimes be used to supplement home made manures.

Tankage. This is the name given to a product of rendering establishments; it consists of meat, bones, hair, gristle, blood, etc., from which the fat has been taken, brought to dryness and ground. It is very rich in nitrogen and phosphoric acid, and is a most admirable manure for garden and fruit crops. I have found it to give good results wherever tried in the garden, but it is especially valuable on lawns and in the greenhouse. I am inclined to think that for greenhouses and pot plants generally it should be used in connection with a small amount of some potash salt. In the open field I have used it at the rate of 1,000 pounds per acre without any injury, and this is probably as large a quantity as could be applied at one time economically. A much smaller quantity, from 400 to 600 pounds, would be enough for an ordinary application to a lawn or field in grass. To the lawn it would be well to apply it several times in the course of the growing season, and if possible just before a rain. Also on garden crops it should be applied several times at intervals of three or four weeks during the growing season. On plants in pots I used it at the rate of one teaspoonful to a five-inch pot, applied to the surface soil. The price at which it is sold at the present time varies from \$10 to \$15 per ton f. o. b. in South St. Paul. This material is at present our cheapest commercial source of phosphoric acid and nitrogen.

Wheat bran. The use of this as a fertilizer is of some extent, but the same material may be had much more cheaply for a fertilizer by first feeding it to animals. It is much cheaper however to use the tankage if the bran is not first to be fed out.

Wood ashes. The use of wood ashes as a fertilizer should be more generally understood. Hard wood ashes is much richer in potash than soft wood ashes and is relatively more valuable. Leached wood ashes are hardly worth more than the labor of spreading on the land as a rule, but on a light sandy soil they have a tendency to compact, which is an aid to its physical condition, but it does not act as a manure. Unbleached wood ashes is almost a special fertilizer for all fruit crops and only needs the addition of a little nitrogenous manure to make it complete. They should never be mixed with such nitrogenous manures as hen manure and other animal excrements, for they start chemical action and in consequence the nitrogen is thrown off in the form of ammonia and is wasted. Unbleached ashes form often a cheap source of potash. Canada soft wood ashes from the mills is sold in the eastern and middle states at twenty-two to twenty-five cents per bushel of forty-five pounds.

Tobacco stems. At times these are to be had near cigar factories for the asking. They are very rich in potash and nitrogen and almost a special fertilizer for fruit, potatoes and root crops. They rot quickly, and in using them a handful of stems may be thrown on each hill, but a better way is to mix them in the manure pile, where they soon soften down and form with the manure a very rich dressing for any crop.

Bones. These may frequently be bought very cheap. They vary much in composition according to whether they are fresh or old. If fresh they

are very rich in phosphoric acid and nitrogen. If burned the nitrogen, the best part, is wasted. They should be ground or pulverized in some way before being used in a clean state. They are much more readily soluble if the grease is extracted, for the grease prevents chemical action. They may also be softened by being somewhat broken, piled up in layers of wood ashes, bones and hot stable manure and covered over with earth after being well watered. The use of the earth is to retain the ammonia that may be volatilized by the violent chemical action resulting from the action of the ashes on the manure and on the bones. It is a good plan to mix ground bone in the manure piles as its plant food is made more available.

Bones are often called lasting manures because the effect of their application is seen for a long time; this is because they are not at once decomposed into soluble plant food, but plant food is forming from them for a long time. They do not come under the head of quick acting manures, but are often rendered so by treating with sulphuric acid, by which the phosphoric acid is made soluble. This is a disagreeable and expensive operation, and should not be attempted at home or on a small scale, where it is more practicable and almost as well to mix them after grinding in heating manure.

Marl. This material varies in composition, but generally is entirely or largely composed of carbonate of lime, which is useless as a plant food in our soils.

Some of them contain a little phosphoric acid and nitrogen, which is of some value. All marls must be bought at an exceedingly low price to have it pay to use them at all while many are valueless. There is a very common opinion at present that they are all good fertilizers.

Nitrate of soda. This is composed of nitric acid and soda. It comes from Chili, where it is found on the surface of dry soils. It is known in the market as Chili saltpeter. This is a very quick acting fertilizer. It contains nitrogen in the form of nitric acid, which is the form in which it is taken up by the plant. On this account it has proved to be an almost special fertilizer for early spring garden crops, because it furnishes plant food at once available to the plant, while in stable manure and other fertilizers the nitrogen must be changed into the form of nitric acid first. Stable manure then contains but little real soluble plant food, and consequently it is best adapted to late crops, for which it has a supply of free plant food formed during the growing season by chemical action.

HOME MADE MANURE.

By home made manure I mean all the excrements of all animals on the place and all material that will decay and make manure when added to a compost heap.

These should be looked upon by gardeners and farmers as the most important source of manure, and if any are bought it should be with a view of using them to supplement these.

In the stables, pig pens, sheep yards and hen houses sufficient absorbing material should be used to take up all the liquid portion of the excrements, as this contains much more plant food than the solid portion.

The manure pile should generally be under cover for it may lose much of its value by leaching in rains, but it may also be too dry. Also remem-

ber that the most valuable portion of manure is the soluble part and is the portion to be carefully husbanded. As a general rule it is cheaper for a gardener or farmer to improve the quantity and quality of his manure pile by buying extra feed than by buying commercial fertilizers.

In many gardening operations it is necessary to have the manure act quickly. Perhaps I might define market gardening as the using of the soil as a machine to turn manures into crops, and farming as the use of manure to supplement the annual amount of plant food set free in the soil. On this account manure for early garden crops should be thoroughly rotted before being applied to the land. The manure from our various classes of farm animals varies very much, and the manure from the same class of animals also varies, according to the food from which it has been made and the age of the animals from which it came. The manure from a well fed, full grown fatting steer is much richer than that from a growing, well fed calf or two year old, because in the case of the steer, there is no material used for building up bone and muscle. Again, the manure from a horse fed on oats and good hay is far superior to that from the same horse fed on bog hay alone.

But this subject is of too vast an extent to be more than just touched upon in such a paper as this. But there is one very prolific source of home-made manure and that is the compost heap.

COMPOST HEAP.

Every farm should have one of sufficiently large proportion to take care of all refuse organic material. It should be made about as follows: Select a place handy to get at, put down first a bed one foot deep of old sods or muck, and on this pile all the refuse material as it collects in various places; it may consist of old straw, leaves, an occasional load of heating manure, rotten vegetables, etc. This should be turned over occasionally, by hand if necessary, but the best plan is to have the compost heap in the hog yard, and to it haul manure as it collects near the stables. If manure is piled up on a good bed of rotten sod, it will not lose much by leaching nor will it lose by heating if hogs have the run of it.

DISCUSSION.

Pres. Elliot: Any questions to be asked on this paper?

C. H. Gordon: What kind of manure we have on the farm would be best to use on a marsh strawberry patch?

Prof. Green: If you use the bed of an old pond it is about as rich as you can make it.

C. H. Gordon: If I was to plow it up for a year or two would you advise manuring before planting again?

Prof. Green: If I had the manure I do not know but what I would use it. I do not know that it should need any manure at all. There is an immense amount of available manure in it, but if you do use manure, wood ashes are better than stable manure.

Clarence Wedge: Would peat be a good addition to our manure pile?

Prof. Green: It is an excellent addition. If it is dry it is a very good absorbent and a man cannot do any better than to haul it into his stable yard.

Joshua Allyn: What do you think of hauling it out in the winter, and working ashes in with the muck?

Prof. Green: That would do very well. It would work nicely on light soil; it would make it a little more retentive of moisture.

Joshua Allyn: Where you can get plenty of ashes for hauling them, would you pile them by themselves or spread them right on the land?

Prof. Green: I should not put it on when the ground is frozen. It would be all right on plowed land or on rough land, but not on a smooth surface. I should prefer to keep it dry in winter and use it in the spring.

Joshua Allyn: What do you think of working it in the earth in the spring where you are going to raise melons?

Prof. Green: I would work it in the earth. I should work it right into the hill.

Joshua Allyn: What proportion would you work in?

Prof. Green: I would put a pint of it to the hill. I would spread it over three or four feet. I would spread it on the surface and work it in when I hoed it. I do not think it would be a good plan to put it on when you plant the seed. I should prefer when the melons are up to spread it around about two feet on each side of the hill.

Joshua Allyn: Did you ever put it in a trench for potatoes?

Prof. Green: It is a very good fertilizer for potatoes.

Dr. Frisselle: Can any fertilizer go into the plants through the leaves?

Prof. Green: No, sir. I think there is no experiment showing that nitrogen has been taken into the leaves of plants.

Mr. Thayer: What is the value of clover cut in blossom and spread on the ground compared with the plowing under of the same clover?

Prof. Green: It is better, of course, to plow it under, because if left on the surface it does not decay so soon, but eventually it will be just as good. If plowed under the material would decay and the action would be quicker.

Mr. Thayer: It seems to me the growers of small fruit do

not realize the advantage of growing clover for use on their fruit. For two or three years I have been in the habit of mulching my raspberries and blackberries heavily with green clover cut in blossom, and I learned several very important lessons from it, aside from its manurial value, which I consider very great and cheaper applied in that way than I can draw the manure from the village a mile distant. It retains the moisture during the dryest season, brings it to the surface; it keeps the weeds down, it keeps your fruit clean, and to my mind it is the best thing we can use for our small fruits.

C. H. Gordon: How would it do to sow clover in an orchard, mow it down and let it lay a year or two and then plow it down?

Prof. Green: It would be all right, but it would be better to plow it in, and better to feed the clover to animals and use the manure.

Mr. Thayer: I can get the manure for its hauling, a mile and a half distant, but I make it a practice to raise as much clover as I have fruit land. I have forty acres of clover and thirty-five acres of small fruit. I cut an acre of clover and put it on an acre of small fruit, and I believe it is cheaper than to haul manure a mile and a half distant. The proper time to cut the clover is when it arrives at blossom, and when you put it down it lies there and makes a close, compact mass.

Dr. Frisselle: How long will it remain moist?

Mr. Thayer: It remains moist a good part of the season. During the dryest portion of last season I would push the clover aside and the ground would be moist as if it had rained a day or two before.

Prof. Green: You simply make manure of the clover without passing it through the animal?

Mr. Thayer: That is the idea. As you lay your plants down in the fall of the year, this clover holds together and makes a very nice covering, and then in the spring of the year as you raise the plants the clover breaks to pieces and you see nothing of it, and by the time you are ready to mulch your plants again there is not a particle of the old clover left. It all works into the ground in spring.

R. P. Lupton: In mulching your raspberries do you put it all over the ground?

Mr. Thayer: No, sir. My raspberries are planted seven feet apart. I place the mulch two feet on each side and then run the cultivator through.

C. H. Bragdon: In a very wet season would you not have to remove that?

Mr. Thayer: No sir. That is not necessary.

C. H. Bragdon: What if you have a regular Minnesota rain?

Mr. Thayer: We have them in Wisconsin.

Dr. Frisselle: What kind do you use?

Mr. Thayer: I use mammoth and medium in order to prolong the season of mulching. You take a medium clover, and for a large plantation it requires a large force of men to use it before it matures too much. By using a mammoth clover I can prolong the season.

C. H. Gordon: How many times do you cut the clover?

Mr. Thayer: Only once; the second crop you can cut for hay.

R. P. Lupton: How thick do you put it around your plants?

Mr. Thayer: About three or four inches. Along in the fall of the year about the time you are ready for covering it will be a compact mass and about rotten.

Judge Moyer: How do you put it on?

Mr. Thayer: My grounds are laid out in alleys. My rows across the entire field are eighty rods long. I dump the clover on each side of the alleys; then I have my stone boats, as we used to call them, and load it on those and go through the row until I reach the alleys, and in this way go clear through all the rows.

Mr. Cutler: Have you ever tried it on strawberries?

Mr. Thayer: No sir, I have never tried it on strawberries. It comes immediately after strawberries are marketed. I rotate it every two or three years.

R. P. Lupton: Do you use any other fertilizer excepting clover?

Mr. Thayer: Not much. I gather up some during the winter when my teams are not doing much else.

C. H. Bragdon: Do the mice ever get under it?

Mr. Thayer: They never have to my knowledge.

Mr. Cutler: Has anyone ever noticed mice working in clover?

Mr. Thayer: I cannot say that I have. I do not think they do, because it decays very rapidly.

Joshua Allyn: I have seen mice work in stacks of clover.

QUESTION BOX.

"What is the relative value, considering the labor, of green manure hauled from the stable and spread on the land, or thrown in the open yard and hauled out after it is rotted?"

Prof. Green: It depends altogether for what crop you are going to use it. If you are going to use it for an early crop it must be rotten; if for a late crop it need not be.

"What fruits or vegetables are poultry manure and ashes best adapted for?"

Prof. Green: In the first place, poultry manure is rich in nitrogen, and should be used for early crops. For cabbage and fruit crops I should prefer to use wood ashes, and perhaps some poultry manure.

TREES FOR SHADE AND SHELTER.

WHAT TREES ARE BEST ADAPTED TO OUR NORTHERN PRAIRIES.

BY J. O. BARRETT, BROWNS VALLEY.

The practical test of tree raising is experimentation. Our calculation has weight as to latitude and elevation, humidity or dryness of the atmosphere, quality of the soil, the configuration of the country, and the treatment of the plants. We need to be vigilant in these particulars for the ends of success. And yet we may be thwarted in our selection of trees. Because elms, oaks, poplars, basswoods, cottonwoods and ironwoods are indigenous in some localities of the northwest, more especially along the shores and in the valleys of the lakes and rivers, we are apt to conclude that any or all of these can be successfully raised on the open prairie. And here is where so many failures occur with unskilled planters. Valley soils are very unlike those of the prairie, and the moisture considerably greater. What specially imperil our young trees are the hot, cold, and drying winds. Our prairie soil is of a black loam, porous, and therefore readily absorbs every element that touches it. Heat and cold penetrates into it as through a fine sieve. I have had fresh, green growing strawberries, set out for a week or more, promising so largely for next year, burned down to their very roots in a single day under one of our fierce southern winds. A like experience has been mine with some other small fruits and young apple and forest trees. Elms, white or red, cannot be safely warranted as fit for the prairie there. Oaks cannot survive transplanted to the open prairie. It is difficult to raise them there from planting scions. Cottonwoods and willows from cuttings are not reliable to develop into

substantial roots except in a moist season. The white willow is a commendable tree with us to mix with other trees and help form a windbreak. The native black cherry is a failure unless specially protected. The hickory, black walnut and butternut may yet live with us under right environment, but it is useless to plant them here and expect paying success. The poplars are short lived. The hackberry will do close by the river companionated in a forest. The balm of gilead is a tough, unshapely thing. The soft maple does reasonably well when numerous other arms closely encircle it. The sugar maple signally fails us thus far. The basswood is promising, but costs too much for forest planting. The birches have generally failed. The mulberry is *non compos mentis*. The catalpa ditto. The european larch does not give us hope on the open prairie. The red cedar, too costly, is one of the survivals. The box elder does quite well when forest planted, four to eight feet apart, and well cultivated during its early stages of growth. It is not, however, the most valuable tree. It is a good pioneer, and fills the letter of the law on a timber claim. Where properly treated it is to be credited as a success. The cottonwood, whether white or yellow, does well in deep alluvial soil, but on most of our prairies it has to take a third or forth rate position. Its roots are surface spreading; when it has grown ten to sixteen feet high, it often shows signs of giving up the ghost, besides no tree with us is so easily blighted in the hot winds just after a rain, and then an ocean of bacteria eats up its leaves. These common experiences have led us to the conclusion that the best trees indigenous to the climate for our northern prairies are the tap rooted. The box elder may be considered semi-tap rooted, and passes as a success; but all things considered the ash is our tree, the white and the green ash; the white more valuable for size and timber. It has a tap root that goes down, down, down even into the crevices of the clays below the soil, and is sure to steal the moisture if any is there. For a few years it grows slow, but all this while it understands its business out of sight. After it has got well seated, in the third and fourth year, it towers up solid and beautiful. In the sixth or seventh year it competes with the box elder, in the eighth year, it beats the box elder; outlines the cottonwood, and is master of the situation. The ash is growing popular and is most sought now by forest planters in our part of the northwest. For a timber claim I advise that the majority of the trees be ash, planted properly in deep well pulverized soil, and interspersed promiscuously with box elders and willows, with some soft maples if you like. With right care in culture and protection against fires, in ten years you have a young natural forest—a blessing to yourself, your neighbors and your country.

Nor should we forget the evergreens for wind-breaks, health and beauty. No trees are more to be desired. Put them in belts of ten or more rows. Use the scotch and white pines, the norway and native white spruces. Set them among apple trees, around the barn, in front and around the dwelling house; and they will be "a thing of beauty and a joy forever."

FORESTRY.

FORESTRY.

BY CHAS. LEUDLOFF, CARVER.

Forests not only furnish the necessary wood and lumber but also protect against the scorching rays of the sun, maintain the springs, favor the producing of rain, the moisture of air and soil and thereby the fertility of the soil; further, they ward off the extremes of temperature and help to keep the soil warm by protecting from too great a radiation. From the leaves not only water is exuded but also oxygen during the day. The forests therefore provide the necessary oxygen for all life. The forest has great influence on the climate as has long been known. In the forests the state has not only great lumber resources but also a great meteorological factor to protect. It is not to be forgotten that the forests have certain influences on the character and industry of the inhabitants. Also the fauna of the forest should not be overlooked, the gay birds, especially the songster, delight all who visit the forests, and if any game appears everyone is glad to notice it, even if he has not tasted the joys of a hunter. Therefore protect and foster the useful birds and squirrels of the forests and prepare habitations for them by hanging up small boxes. The care of the forests and game does not always go hand in hand, but the poetry of the forests loses much if the woods and game are not properly cared for. The best that the forests possess are their ancient and all-inspiring trees, their permanence, and the imposing architecture of silent nature, which is not easily forgotten. The high trees with their arching foliage and their ancient, giant branches, with their wild scenery are more to the lover of nature than the architecture that science worships. Everything has its time and the ancient tree must finally give away, but spare it where its rare appearance warrants it, until necessity demands its removal. But the old hermit, the witness to the power of nature, and who has seen centuries and whole generations with their history pass away, who among millions of trees has his peculiar name, and who long ago has seen many of the sons of the forest fall, allow him his place until the storm reaches him and his last leaf has fallen. Then place in memory of him a young tree, a memorial to him in the great forest. From the foregoing statement the importance of the forest as the storehouse of nature and mankind is easily understood, and therefore we should desist our warfare against it. The history of all civilized people teaches us that after devastating the forests they found that they were losing ground in all their industrial branches and they were compelled to replace their destroyed forests, whereupon all branches of industry again became more prosperous. It is to be noticed that where nature has placed her forests it is well not to destroy them, but they should be fostered and protected, then the otherwise barren heights and rocky slopes will then add prosperity to the valleys and agricultural districts. Therefore we must be aware that we do not follow in the footsteps of those nations who have devastated their

forests and felt the evil effects of the devastation, but come to the help of the forests and commence in earnest with great energy to replant them for the benefit of ourselves and our descendants.

Our greatly devastated forests may be improved and their former thickness replaced. 1. By natural propagation. 2. By the artificial cultivation from seed and planting.

The replanting lies largely in the hands of the nurserymen. The natural propagation by self-seeding and suckering stands opposed to the artificial propagation by hand seeding and cuttings. It depends upon certain conditions, as for instance; the trees must be old enough and in condition to bear seed, furthermore the suckers or shoots must not be over a certain age; if these conditions are not fulfilled natural propagation will not be successful.

In raising new varieties, where the soil is not fitted for these trees, natural propagation will be unprofitable; on the other hand it is necessary or to be recommended with varieties that cannot be grown without the protection of the parent trees, as the beech and white pine; also when they are to be grown on elevated spots, on steep hill sides with rocky soil, or other places where cultivation is made difficult by ravines, gullies, or rockiness of the soil and where the results are endangered by insects, or the soil is in such condition that the seeds germinate freely.

On the other hand, artificial cultivation is necessary when large, bare places are to be planted, new varieties are to be grown, or where trees are to be grown, which do not as yet or will not bear seed enough, or where trees have lost the power to sucker, or where natural propagation from other causes is not certain.

Propagation can take place by surrounding with timber protection, seeding on such places where no natural seed can be expected, or where a certain species under timber protection is not in sufficient number or not at the right age. As, for instance, seeding large clearings and bare places with species that in their youth have little to suffer from frost and weeds, and which are not easily and cheaply transplanted, as beech, oak, alder, etc.

The seed is adapted to soils that are not wet or swampy but also not too dry, poor or stony; good results cannot be expected on raw highlands, on sunny sides, or too loose, swampy, or soil highly impregnated with lime; on the last two because frost on leaving heaves the plants and therefore growth from seed is very uncertain.

The want of sufficient seed or its high price are often drawbacks for propagating from seed. Planting is the next resort when the requirements for seeding are not favorable, or where the seeds in germinating are endangered by birds, mice, etc., as in replanting in the underbrush or otherwise when the surrounding plants have the start. Planting is also resorted to in restoring certain peculiar varieties or in raising tender varieties.

Natural propagation is generally preferred by owners of small pieces of timber land because it is easier and costs less. This is done as follows:

If the prospects for a seed crop are good a part of the trees are felled and those with good crowns are selected, those that are not easily blown down by the storms. All branches, moss and leaves must be removed, as otherwise the seed could not germinate, because the seed would lodge in the moss, germinate and then die during the dry weather.

With the so called shaded seed-bed the remaining trees are allowed to touch each other with the extremities of their branches or they may be separated from three to nine feet or even more, according to the soil, situation, climate or variety.

In the course of a few years the plants will have grown so much that they will need more light which is essential to their growth; thinning out is not done all at once, but at different periods and with regard to the development of the growth of young wood. The thinning is generally done in winter during deep snows and mild weather, as it thus protects the plants better; in thinning the last wood is removed after the plant has become strong enough to dispense with protection.

The time of cultivation varies from 10 to 20 years, according to circumstances.

All thinning out which is undertaken at the different times should be, as already mentioned, in winter with deep snows and mild weather. The wide spreading limbs should first have their large limbs removed and the ground should also be cleared of all branches, leaves, etc.

The trees should be felled in the direction in which they would do the least harm and several trees should never be felled in the same direction so as to fall upon each other.

The further care which the forest should yet receive is the warding off of harm, as fire, grazing of cattle and insects.

Through fire the greatest destruction has taken place; millions of acres of the best pine forests have been ruined by this element. Our greatest attention should therefore be directed to prevent this as much as possible, and should a forest fire break out we should try with all our power to master it, before its dimensions become too great.

The cause of forest fires is generally the negligence or malignancy of man, seldom lightning; the loss caused is more or less, according to the growth of the trees and the intensity of the fire. The fire may also do great damage in the clearings by heating the surface soil to so great an extent as to burn the humus therein contained. As long as it remains here it is called undergrowth fire, also if it attacks the wood growth; here it may run along the foot of the trunks and burn the attached moss and lichens; by great intensity also the bark—and if the last is not well protected by a very thick bark against the effects of the heat the burnt part will die off, and if very large the whole tree will sicken and may eventually die. Generally the greatest loss is on the windward side and affects the larger trunks less. The tall, young, slender trees and the younger growth are generally hurt so much as to kill them. In younger plantings in which some of the branches of the trees reach to the ground the heat of the undergrowth fire first dries the needles and then immediately sets them on fire, which spreads to the rest of the planting and is then called a "forest fire" and if the intensity is great and the woods thick it not only devours the leaves but also the branches and trunks.

The danger of a fire differs greatly, according to the time of the year, the growth, the thickness of the forest and the variety of timber.

The most dangerous time is the dry time in spring and late summer, while after long rains and in winter hardly any danger is to be feared.

Where the ground is covered with dry grass, moss, etc., the danger is very great, especially on south slopes and hot sands.

The pine trees are generally the most threatened; in leafy woods the loss is least as the trunks are always capable of throwing out suckers.

The preventive means (in Germany) are laws and police surveillance, and should also be practiced here; to these belongs the law: Preventing the building of a house within a forest or within a certain distance; further, the distance is fixed for lime and plaster ovens as well as brick-kilns, and the law against the building of a fire in or near the woods without necessary precautions for the means of prevention at the dangerous times of the year.

To these the following laws also belong: The selection of a place for building of a fire on ground free from weeds and not near any ground covered with them or young trees; surrounding the fires with stones and completely putting it out before leaving it.

In dry, windy weather fires are not to be built in the woods; the same is to be noticed in building fires near the forests as, for instance, building fire in the stubble.

Along the railroads at certain distances (bare) strips are also to be burned in order to prevent the sparks from the locomotives from originating fires.

Those who smoke tobacco, especially those who use cigars, breed themselves to have especial care, and also the hunters, in regard to the use of their weapons.

In order to put out fires that have already started, it is of the greatest importance to bind the inhabitants of the neighborhood by law to help extinguish it.

In large timbered districts it is absolutely necessary to have what are called fire streets or snares, with which the forest is perforated at certain distances from each other, according to the situation of the district, and at both sides of these roads ditches are dug and *Boswellia Senata* are planted to bar the progress of the fire. The middle of the way should be kept clean and the broader the roads the better.

It is further of great importance, in warding off the danger of fire, that plantings should be kept clean early in the year, especially is it necessary to remove broken limbs, bush heaps and the dead leaves as early as possible; this is especially necessary near railroads and much frequented highways where carelessness or malignancy can very easily do great harm.

It is best to extinguish an undergrowth fire by throwing earth on it. Where the dimensions of the fires are not very great it can oft-times be extinguished by the use of brooms, spades, green leafy branches, etc., if the dimensions are great it is not possible to approach the fire in order to use these means, in that case, according to the strength of the wind, a strip of land 10 or 12 feet wide running parallel with the fire and a short distance from it, should carefully be cleaned of all combustibles and watched by a sufficient number of people until the fire has reached it, in case it should spring over.

If the number helping are not sufficient in order to clear such a strip early enough, it is recommended to effect this by starting a backfire; but this is only possible in quiet still weather and eventually requires as much help to watch the fire as it took to make the clearing.

In places where much decayed wood and dried humus is present and

where fine earth or sand is not to be had in sufficient quantities, water must be used for extinguishing, as the fire remains for a very long time in them and is easily spread from them.

After the work of extinguishing has stopped a sufficient number of men should be left to watch the place until no more danger is to be feared.

It is impossible to calculate the loss caused by a fire running through a pine forest, whose needles or the most of them were destroyed; it is best to cut them down, as the majority die. In case of a fire running through a grove of leafy trees, it is best immediately to cut down the trees, in order that they may start suckers from which trees equal to the first may be quickly grown.

We have yet to consider the pastures in the forest and to see what damage pasturing does to the forests.

The forest pastures are damaging to the timber, by having the cattle browse off and tread them down; the heavy cattle compact the earth; especially is this damaging in clay soils, where the atmosphere cannot penetrate the compact surface.

On steep hillsides the surface of the soil is not compact by the feet of animals, and therefore is not disturbed on the surface; its looseness thus offers a good place for the water to work, so that the humus is easily carried off.

The browsing off of the tops, breaking down, tramping, barking off young and old trees, and the inevitable damages done to the drain ditches, sum up to a good deal.

The leafy trees recover much sooner and easier from browsing, tramping or barking than the needle trees or the coniferae.

In cultivating in rows the cattle do not do as much damage as otherwise, but this is not always the case, as on steep hillsides where they use the furrows for paths.

The repeated browsing of the tips of trees is very damaging.

PRESERVATION OF THE FOREST.

P. P. SCHOTZKA, MINNEAPOLIS.

Mr. President, Ladies and Gentlemen:

If I, in the presence of so learned a body as here present, humbly undertake to say a few words in behalf of a subject which should form a main link in the chain of agricultural and horticultural discussions, so, believe me, that this is done out of pure patriotism to the country and her people and for the benefit of the subject itself, which is, "The Preservation of the Forests."

While agriculture and horticulture receive the benefits of science and assistance from states and have wonderfully improved, arboriculture or forestry, as the third link in the chain, has been sadly neglected.

From year to year the advertisement of the lumber dealer informs us how many hundred million feet they have harvested, but do we ever see a statement in which a lumber dealer informs us how many trees he has

planted? No. What must be the result? An entire devastation of our forests, a treeless country, and what that means is well known to all members of your association.

The time in this state is not far distant when the grave song to the last extensive forest will sound through the land, which song will also be the grave song to the prosperity of the farmers and horticulturists; it will be the signal for the disappearance of the water in our lakes and in our great Mississippi; it will mean the most fearful electrical storms at one time, while at other times long, lasting drought will visit the country; and all these the more as our neighbor state, Wisconsin, will have followed our example and will have silenced the echo of the woodman's axe. Dakota and Iowa, in despite of their efforts to plant trees, will be treeless states.

Gentlemen, this is no exaggeration, it is history, told in all those countries where the forests have disappeared, and it will take place in our state as certainly as night follows day. Then equal causes produce equal effects and equal consequences, and to the observer of nature the fact can not be denied that the danger signals are already making their appearance, and cannot have escaped the sharp eye of Minnesota horticulturists for meteorological occurrences.

In the face of such disastrous results that follow the destruction of forests in a country, naturally the question arises: *Is there no remedy?* The discouraging answer "No" meets our question, not as long as the present practice is upheld. Not talk shall replace and preserve the forests; it requires action, immediate action, united, determined action.

Will preservation of the still existing forests serve as remedy against total destruction?

We may just as well forbid one of the here present gentlemen to harvest his ripe crop of strawberries as to say to the lumberman, preserve these forests even if they are ripe for harvesting, until the best trees of the same are rotten and decayed, consequently unfit for the market. Forest trees as well as other crops come to maturity at certain age and if not harvested at the proper time valuable capital is lost and nobody has a benefit of it except woodpeckers and coons. The most natural and financially most profitable time for harvesting timber is at maturity and if another harvest is the object to replace the same by three year old plants as soon as possible, so as to give the young plants the benefit of using the deposited substances by the cut down trees before the sun or atmospheric influences send the same into the universe.

Now, Mr. President and gentlemen of the convention, please allow me to recommend to you one way by which a great gain to success may be realized, and if an earnest effort is made and an unanimous action on your part is taken, failure in this instance is, in my opinion, impossible.

As the last big extended forest in the extreme northern part of our state is in danger to be soon divided into homesteads, and thereby the existence of the same becomes questionable, the reservoir for the Mississippi river destroyed, an entrance to the full blast of the north wind to the state opened, and the great benefits of this present forest to agriculture lost, it becomes the duty of your influential body as well as the duty of every citizen in this state, to petition the present legislature to send an appeal to congress against the division of this forest to settlers, but give to the state the privilege to save this forest for all future time as state

property under the promise to treat the same in accordance with the best scientific and practical rules for the benefit of the country, as well as for the state.

As the United States give new settlers tree claims, with almost a certainty that no trees will be the result, why not give a responsible state which is willing and able to fulfill her promise, this so important area as a total tree claim?

It is thus the more proper as the father of the rivers receives a great supply of water from this source, which would be stopped by the destruction of the forest in question.

The state will not have any expense which will not be covered from the sale of wood, but will realize a surplus and a cash income, besides the great benefits derived for agriculture and commerce.

A gradual renewing of the trees may take place in dividing the whole in forty or eighty parts or sections, and every second or every year a section may be renewed, so as to have a circuit of eighty years for the whole, after which the first cut down and rejuvenized will be again ready for the woodman's axe, with far more material upon it than for the first cut.

God's speed and best luck for a beginning in the right direction, the good example will encourage followers in the same or other directions with the aim of possessing forests.

Hoping that this earnest and well meant request will find willing ears and a strong will, which does not shirk before obstacles, I am gentlemen,
Yours very respectfully,

P. P. SCHATZKA,
German Graduated Forester.

Minneapolis, Jan. 19, 1891, 611 25th av. S.

FORESTRY.

BY B. E. FERNOW, CHIEF OF FORESTRY DIVISION, DEP'T. AGRICULTURE.

For more than twenty years forestry has been talked about in this country; but in proportion to the efforts of those who would have our present attitude as a people toward our forest resources changed, there has been but little accomplished practically.

One reason for this slow progress in forestry reform is the fact that not even the friends of this reform are fully aware what is meant by it. But few of them understand exactly what the aims and advantages, what the methods and practices of forestry are; and hence they have not been able to effectually influence those who are expected to practice forestry.

The lumberman has been led to believe that the movement for forest preservation was inimical to his trade; the owner of woodlands was kept in fear that an unreasonable control of his property might be attempted, while the planter in the treeless plains was led to expect more from his efforts than is reasonable, and tree planting was made to appear equivalent with forest planting. The methods and practices of the nurseryman or orchardist were believed to satisfy the forester.

In Minnesota both branches of forestry, namely the management of

natural forests and the creation of artificial forests, claim almost equal attention.

With an area estimated variously from 20,000,000 to 30,000,000 acres of virgin forest, largely on non-agricultural land, a resource, which at present yields in annual values not less than \$20,000,000, and employs at timber cutting in the woods alone 20,000 men, every citizen of the state must be concerned in its rational use and continuity; while the southern and western areas of prairie invite the attention of the forest planter.

As far as the natural forest resource is concerned, I believe there is practically nothing done to protect it against useless and reckless devastation by fire, or to so utilize it, that it may recuperate itself with desirable growth.

There is, to be sure, on the statutes, a law prescribing a fine against any one willfully or negligently setting fires, but without any organized effort to enforce the law, it is probably entirely useless.

The efforts in the direction of forest planting have been perhaps more effectual than in the care and rational use of the existing forest area, thanks largely to the interest and enthusiasm of the late Leonard Hodges, and the subsequent exertions of the State Forestry Association. Judging from a distance this movement for the extension of forest areas is progressing much more satisfactorily than that for the rational use of the existing woodlands.

The need for windbreaks on the prairie has stimulated tree planting, but the planting of windbreaks, consisting of single rows of trees, to sift the cold northwester, break their fury and temper their iciness, can be improved by substituting timber-belts of sufficient breadth to more effectually and for a greater distance break the fury and also to alter the moisture conditions of the prairie winds; for these injure crops and orchards not only by their cold but by their excessive dryness.

In planting to forest, it must not be overlooked, that the methods should differ from those practiced in park and orchard planting. In the latter case we have to do with individual trees; each one is an object of our care. In forest planting we have to do with masses of trees, the individual being only of account as far as it forms part of the mass. Hence to get the mass effect, by which forest conditions alone become influential, we must practice mass planting and dense planting.

In the selection, then, of trees for forest planting, we must first look out for a cheap, easily grown kind, that will cover, and keep covered, the ground. When, by the aid of such, we have created forest conditions, then we may introduce a sufficient number of the better classes of timber trees, which would do well under the protection of the nurse-cover.

This latter should be of a densely foliated kind, which protects the soil against evaporation, by its shade, kills out weeds and renders cultivation unnecessary. Evergreens, any kind that can be most readily and cheaply grown, should form part of this first cover. I should advise to use at first no other kinds than those which belong to your region naturally and have shown their capacity to withstand the ills of the climate.

That mixed planting is preferable to planting of each kind by itself is not only a lesson to be learned from nature itself, but is so well established in the better practice, that it needs no discussion. For the considerations and rules that should be followed in choosing mixtures, I refer

to my reports, as I may not take the time here to enlarge upon this most important theme.

While the efforts to enlarge the forest area, especially for protective purposes, naturally interest the horticulturist foremost, he must not overlook that the manner in which the natural forest cover is treated, concerns him as much, both in his capacity as a citizen and as an orchardist.

It has been shown repeatedly that horticulture has suffered by opening up large sections of country to unfavorable winds. The receding cultivation of the olive in northern France is a familiar example.

In Michigan, I believe, the cultivation of the peach has been hazarded by forest destruction.

In another place I have shown that many of the insect pests which injure our orchards, can be traced to the improper treatment of our forest areas, the dead timber from the burnings furnishing a favorable breeding place for hosts of orchard destroyers.

I have called your attention to the fact that the forest resource of Minnesota yields a product worth twenty millions a year. That means employment to many men and material development of the state. Is it not desirable to keep in perpetuity such a resource? This can only be done by not wasting the forest area with the scourge of fires, and by using it in such a manner that it may re-cover itself with desirable timber. Hence some knowledge of forestry principles is necessary.

Now let it be understood that in a wooded country, forestry is carried on by the use of the axe. There is only this difference between the lumberman and the forester; that the former cuts for present gain without regard of the future, while the latter, without losing sight of the present gain, cuts in such a manner, that instead of leaving a waste of brush for nature to do with as it pleases, reforestation with desirable kinds will take place under man's direction and will.

How is this reproduction secured? To understand this it is necessary to realize that, as in the animal world, so in the vegetable there is a constant struggle for existence and supremacy going on among the different species as well as among the individuals of the same species. All struggle for the occupancy of the soil. The weapons with which this struggle is carried on are various, offensive and defensive. This species seeks to gain foothold by prolific annual seed production, aided perhaps by the lightness of the seed, which is wafted by the winds for miles in all directions; the ubiquitousness of the aspen wherever an open space affords light is accounted for by this capacity.

Another species, by its dense foliage, shades the ground so that no rival can find favorable conditions of existence underneath, such as firs and spruces. Others, again, maintain themselves by developing a vigorous root system, which enables them to endure the shade of the superior growth, vegetating poorly, but biding their time until other agencies have decimated the enemy, ready then to occupy the field. The oak is an example of this kind.

The alternation in forest growths, so often looked upon as a mystery, is thus accounted for. Man, by fire and axe, nature, by tempests and insect pests, removing the superior growth, the species which persisted under the

shade of the former and escaped or resisted the destructive agencies will occupy the ground.

Especially the different requirements in regard to light conditions and the relative rate of height growth, by which the species or individual may or may not escape suppression by its neighbors, influence the temporary local distribution of plants and are of the greatest interest to the forest manager.

Light is one of the essential factors of tree growth, and almost the only one which man can regulate. Forest management, then, could be defined in the main as management of light conditions. The leaves functionate under the influence of light and feed the tree by assimilating the carbon of the air. Such thinly foliated trees as the aspen and some of the birches and others can only exist under a full complement of sunlight; they are, therefore, endowed with a rapid rate of height growth to enable them to grow quickly out of the danger of being overshadowed by their neighbors. Other species, like the firs, and in less degree the spruces, with a dense foliage and a large number of leaves to functionate, can be satisfied with less light and are as a rule slower growers; other kinds again, like the oak, while dependent for their full development on a large amount of light, probably by virtue of specially vigorous root action can persist in the shade for a long time until more favorable light conditions allow thrifty growth.

Especially the young seedlings of most kinds are very sensitive in regard to light conditions, and some have such a small range of light and shade endurance that, while there may be millions of little seedlings sprouted, they will all perish if some of the mother trees are not removed and more light given; and they will perish equally, if the old growth is removed at once and the delicate leaf structure under the influence of the direct sunlight and heat is made to functionate beyond its powers.

We can, then, understand that not only the different species, but the same species at different periods of life, make varying demands in regard to light conditions, and the art of the forest manager in securing reproduction, as well as in other operations, thinning, etc., consists mainly in a proper regulation of light conditions by proper and timely use of the axe.

The composition of the forest, climatic, soil and moisture conditions modify again the requirements, so that all general rules of management need to be modified according to local conditions, and it will appear at once that a considerable exercise of judgment, born from experience and knowledge, is expected of the forest manager.

The practice of the forest manager then is to assist the desirable species in the struggle for existence and supremacy, to antagonize the undesirable ones, and to create proper conditions of soil, light and composition of species for a desirable reproduction.

The practice of thinning is based on similar principles. Regard to the danger of windfalls, of fires, of frosts to the young plants, etc., will also influence the management.

So much for the technical part of forest management.

Before concluding I want to call your attention to the improper clearing of lands for agricultural use; cold, thin, stony and rocky sites and declivities are devoted to farming, yielding only a precarious living to the

planter, which should never have been used for anything but tree growth. The relegation of soils to proper uses, is a problem, which you should help to solve and one in which forestry is involved.

Let me end these few remarks on a large and important subject, with the admonition to each one of the members of your association to imbue himself with a proper conception of its importance to his own interests as well as the interests of his state and to become an active missionary, not only for forest extension, but for rational forest utilization.

REPORT ON FORESTRY.

BY J. J. SANDERS, APPLETON, MINN.

The question of tree planting and cultivation is a very important one to the prairie farmer, and one that cannot receive too much attention.

I came to this part of the state when tree planting was yet in its infancy, and have watched its growth with considerable interest.

A little experience is sometimes valuable, and cheap if we are only willing to take it second hand; and we may often derive profit from mistakes as well as from successes.

There are two mistakes I have noticed, which, if avoided, greatly lessen the trials of the tree planter. The first is a poorly prepared soil, and the second is an improper selection of varieties.

If the soil is not well prepared and kept cultivated, the weeds and grass soon become so tall and thick that it takes the little trees years to struggle through, only to become scraggly bushes.

In the second place, if, after years of patient care, the planter finds his trees do not answer the purpose for which they were planted, he is apt to feel that there is some things in this world that make a man "tired" besides hard work.

For rapid growing trees the white willow, red maple and yellow cottonwood are good. For more permanent varieties the ash and butternut do well here. Some year-old black walnuts look well, but their ultimate hardiness remains to be proven. The box elder is a great favorite with some planters, but to me their only recommendation as a forest tree is their extreme hardiness.

THE COMPANIONSHIP OF TREES.

BY E. H. S. DARTT, OWATONNA.

Read before the Northern Iowa Horticultural Society.

The stars seem gathered together in clusters, minerals are usually found in beds, beasts in herds, birds in flocks, and bees in swarms, and men thrive best in communities.

This all pervading law seems based upon the fact that each individual is capable of affording partial protection to its neighbor; and perhaps this principle is nowhere illustrated with greater force than when applied to trees.

We cannot tell why stars cluster most in the milky way or just how each individual star contributes to the balancing up of the comparatively

unknown universe; but we know why trees abound in certain sections. It is because conditions there are favorable to their growth. We know too that the same conditions will always produce the same results. And it matters not whether these conditions are secured by natural or artificial means. The grower of evergreen trees from seed finds little trouble in modifying the atmosphere to suit his necessities.

If we plant an apple tree away out on the wind swept and sun scorched prairie it will be so very lonesome that it is likely to die of a broken heart. But if we will first plant other more robust trees, to partially shade the ground and check the withering south-west winds, we may have rendered such assistance as will enable the apple tree to grow, and in the growing assist other trees weaker than itself. Thus each added tree helps to create conditions favorable to the growth of other trees, and gradually a diversified forest may be made to exist where at first only trees of the most robust habits could be made to grow.

Many people believe that when our prairies are well dotted over with tree plantations our rainfall will be materially increased. Certain knowledge that tree plantations had increased our average annual rainfall but one inch would be the key to unlock to future generations cumulative blessings of great magnitude. Then we could steadily encroach upon now desert places with the certainty of making them fit places for the abode of civilized man.

Those who fully realize the situation are very solicitous about the destruction of our native forests and are anxiously watching the feeble efforts now being made for the preservation of what still remains. The strong probability now is that nearly all must go, and that new growth and plantations must be entirely depended upon in the near future. This gives to tree planting an unappreciated importance, and we should use every means in our power to push forward the good work. Whilst we would be eminently practical, we must not ignore sentiment. Many a grand old tree now owes its existence to the sentiment expressed in the lines

Woodman, spare that tree,
Touch not a single bough,
In youth it sheltered me
And I'll protect it now.

If the principle of life in one tree helps to prolong life in another tree, and if there is an intimate relationship existing between the vegetable and animal kingdoms, then the health, happiness and longevity of man may be due far more than he realizes to his companionship with trees.

Certainly if we would build most wisely for the future we must teach the young, by precept and example to plant, love and protect trees.

Dame Nature's laws may we unfold
As if the world depended
On our weak powers to grasp and hold
The blessings God intended.

WILLOWS, POPLARS AND EVERGREENS.

By L. R. Moyer.

NOTES FROM CHIPPEWA COUNTY.

It seems proper to put on record some notes on the Russian willows and poplars sent out by Prof. Green. The trees I received were planted in the spring of 1889 and so have made two seasons' growth. The past two seasons in western Minnesota have been extremely dry, and very unfavorable to young trees.

At the head of the list I would place the Wabsky Poplar (*Populus Wabksi*). This poplar made a growth during the present season of $4\frac{1}{2}$ feet and during the two years a growth of 8 feet. The tree is healthy and stocky with bright shining leaves, and full of promise for the future. I understand that in its native home it becomes a large tree. I believe it to be full of promise for prairie planting. It is very hardy.

The Certinensis Poplar (*P. Certinensis*) made a growth of six feet this year, and would probably have made a growth of ten feet during the two years had not a small boy broken off the first year's growth. This is an upright poplar of great beauty. It starts from the terminal buds and seems to be entirely hardy.

The Laurel Leaved Poplar (*P. Laurifolia*), a thick leaved poplar, a native of arid regions, is a tree of great beauty. It made a growth this year of three feet, and during the two years a growth of six feet. It is accustomed to drought in its native habitat, is hardy to its terminal bud and full of promise.

The Siberian Pyramid Poplar (*P. Siberica Pyramidalis*) closely resembles the Laurel Leaved Poplar when young, and is perhaps of a little slower growth. It, too, is accustomed to a cold, arid climate, but it is full of life and vigor, and is a beautiful tree.

The Dudley Poplar (*P. Dudleyi*) has narrow leaves and resembles a willow in its general appearance. It seems to be entirely hardy, and this last season it made a growth of $4\frac{1}{2}$ feet.

All these poplars were planted on extremely dry western Minnesota land. They all grew readily from spring made hard wood cuttings. The cuttings made an average growth of 2 feet, although last season was extremely unfavorable.

The red willow (*Salix fragilis*) made a growth of three feet each year. It is hardy to terminal bud, and will evidently grow up into a tree. In Europe it is said to be a large and valuable timber tree. I found no difficulty in getting it to grow from cuttings, although many farmers had trouble last spring in getting their white willows to grow. The cuttings made an average growth of three feet. They were planted on a dry bluff.

Salix rosmarinifolia is a shrubby willow with beautiful blue foliage. It is a fine ornament on the lawn, and very hardy, but probably will not grow up into a tree.

Salix virella is not hardy, nor is the willow sent out as No. 14 Vor., which greatly resembles it.

The Napoleon willow, (*S. Napoleonensis*) is also tender.

Among conifers I regard the dwarf mountain pine (*Pinus pumilo*, or *P. pumilo Mugo*) as our greatest acquisition. This pine is a native of the high mountain regions of Europe. In western Minnesota it seems to be the only evergreen that is able to retain its green color unimpaired through our dry and cold winters, although the Colorado blue spruce (*Picea pungens*) promises well.

TREES WILL HELP OUR CROPS.

BY PROF. W. M. HAYS, ST. ANTHONY PARK, MINN.

While the culture of trees and plants is ennobling, and the products of the forest, the orchard and the garden are of very great value, the horticultural matter most needing agitation now is that of forests, to modify the extremes of our climate. We look upon the extreme cold of winter, the periodic summer extreme of drouth, and the dryness of the summer air, as our worst climatic disadvantages. We know that cutting off forests in numerous older countries has changed the humidity of the air, increased the extent of summer drouth, and even made more severe the storms of winter. But few look at the situation in this great valley of the Mississippi calmly and contemplate the wide area which is affected. A lessening of a few per cent. of the days of summer drouth alone would be worth many millions to the country. Only the men who study forestry as a science, realize that the raising of our needed supplies of lumber and other wood in a systematic manner could have beneficial effect on the climate of so vast a region. When the nation does realize the fact, as a shortage of lumber must soon compel it to do, our people will act, and it is our duty to keep on agitating the question and bring action as soon as possible.



I have here a drawing illustrating a few things regarding the moisture of the center of this continent and how we might better utilize it by keeping it in our soils and in the air for all crops, and for making the climate more comfortable as well. In the central part of the Mississippi valley running north and south is a wide level basin in the very center of the continent, which is little more than a thousand feet above sea level at any point. From this low part a branch of low land swings off across the

great lakes and down the St. Lawrence river between the Alleghanies to the south and the Canadian hills to the north thus reaching the Atlantic ocean. This broad lower land in the center of the continent, designated by parallel lines, is highest at the head of the great father of waters, descending gently across the broad expanse, northward to the Arctic ocean as well as southward to the mouth of the great river. To the west of this central lower strip the plains rise gently but considerably toward the Rockies, while the land to the east rises toward the foot of the Alleghanies. So far as the moisture bearing winds of this entire valley between the two systems of mountains are concerned, they flow up this central trough from the Gulf of Mexico as into the lower end of a funnel. The great trade winds of the central Atlantic ocean pour in the Gulf of Mexico and are deflected northward by the rib of elevated land along the western part of both Americas. These great winds bring into this valley nearly all the moisture they get from the ocean coming in just where the Mississippi returns the surplus water to the ocean. The winds coming from the west have their surplus moisture all taken out by rising up over the cold Rockies and the small amount of air coming into the valley from that direction is only made warmer by passing over the plains and become absorbers rather than suppliers of moisture. The winds which might come from the east over the Alleghanies likewise cannot bring a surplus of moisture from the Atlantic. The winds coming from the north are warmed as they flow southward over this broad intercontinental region.

Practically the two sources of the moisture in the atmosphere, in this entire region, seem to be that brought in from the gulf and that evaporated back into the air from the soil, from lakes or other water surfaces, or through plants from the soil. Some one has estimated that only enough water runs out of the Mississippi valley, through rivers each year, to equal one-fifth of the rainfall, and we can then assume that only one-fifth of the amount annually precipitated is brought into this region by winds from the ocean, otherwise water would be stored up here, and our soils and air would become master. This we know is not true. The other four-fifths must be supplied to the atmosphere by evaporation, the same water being re-precipitated and re-evaporated often. There are many factors operating to cause precipitation from the air. To roughly illustrate, we may say that the moisture-laden winds from the gulf flow northward meeting the cold winds, flowing from the north, and that a mixture of these two is cool enough to cause the southern wind to give up moisture. In summer the wind from the south seems to have the mastery, while in winter the great sheets of wind from the northward sweep down carrying the gulf wind back. There are a few things which illustrate how these two winds mix or combat each other. Both are directed to the eastward, (see map N. W.—S. W.) and as they meet the two combatting winds form a resultant of their combined force. This resultant, of course, flows eastward and finds its escape across the lakes and down the St. Lawrence river to the ocean. That there is something of such a resultant wind is shown by the fact brought out by meteorologists, that most cyclonic storms of this valley pass from the west toward the northeast, having, as some one has said, their focal center in the vicinity of Iceland. The flowing of this air toward the eastward carries most of the moister air to the region east of the Mississippi, there giving

up enough moisture to have fostered the primitive forests with which all that region was covered. The moist air flowing away from the more elevated plain to the west, left that region supplied with air largely from the north, west and south-west. This air, not containing a great amount of moisture, is warmed up and made to absorb rather than precipitate moisture, hence the low humidity of the air, the small rainfall, and the consequent absence of trees on the plains and prairies. The mixture of cold and moist winds was facilitated in the eastern part of the valley while in the western part the air was "rarified" so far as humidity is concerned. Of course, I have illustrated the workings of the winds in the most general way. As the settlement of this country has crossed the valley of the Mississippi, from the east to the west, considerable change has been wrought in the surface of the land and in the amount of moisture held in reserve to be evaporated into the air. Forests which are great water conservers have been destroyed, especially in the eastern part where most forests existed. In those forests which have been allowed to stand, much of the old-time forest conditions have been destroyed by clearing out and pasturing the lands, thus giving the water of rains, formerly held by the decaying leaves, a chance to run off over the surface of the closely packed sod. Sloughs, ponds and even lakes have been drained, and streams also have been relieved of most materials which formerly clogged their rapid flow. The thick matted grass of our prairie has given way to cultivated fields and closely cropped meadows and pastures. The condition of the soil in our corn fields, for example, is in such condition as to thoroughly take in the waters of rainfall, because acting like a sponge it draws the water into itself. But these crops are mostly very leafy, usually evaporating it rapidly back into the air, not allowing it to be stored up in the soil and subsoil. The closely shaven and hard soil in our pastures does not readily absorb water, but allows the rainfall to largely run off and eventually reach the great rivers. This is especially facilitated by systems of artificial drainage.

Explain it in whatever way we may there is no disputing the fact that the cultivation of new sections of country, prairie as well as wooded lands, immediately lessens the amount of water in the soil and subsoil. Sloughs go dry, ponds and lakes become shallower, or dry up entirely, the ground water sinks as is shown by our being compelled to dig wells deeper ten to twenty years after settlement begins, in every neighborhood. Even many of the hillside springs which were perennial during the first years the country was occupied dry up, and not a single new one is observed to burst forth. That there is a lessened supply of surplus ground water as the years go on, no intelligent western farmer who has passed twenty or more years in intimate acquaintance with the land in any neighborhood during its complete settlement will deny. Most meteorologists run squarely against a very important fact when they claim that the annual rainfall in the upper Mississippi valley is not being modified by man. While I believe that the main effect on our water supply is in the lessened humidity of the air in the warmer parts of our summers, thus causing more severe drouths, I suspect also that our rainfall is slightly decreasing in the warmer summer months. The supply of conserved moisture nearly gives out and there is not enough to keep up the supply in the air when the atmosphere is warm and able to hold its maximum amount before

becoming saturated. Moisture being a great equalizer of temperatures an unnatural condition is engendered in our summers from a lack of the normal amount of it to be evaporated. Rain can not descend upon great plains that have become warm. The heat in radiating from the earth warms the atmosphere, only dissipating the forming clouds, and there is not enough moisture being evaporated to keep the warmer air supplied with the increased moisture it is able to hold.

Some one asks, how will trees remedy this evil in this vast country? In two ways. By planting large forests and making in them true forest conditions, considerable moisture is stored up in the soil, and a large part of it held until the drouthy summer period is far advanced, and thus given out when the air is most in need of it. Also by cooling the air and acting as centers of precipitation, thus starting rainfall, which in turn cools the surface on which it falls and makes it easier for rain to fall from the wind next blowing that way.

Capital, in this country, finds such great opportunities for quickly turning over and doubling itself, that individuals and corporations will not plant forests. Farmers will plant windbreaks and patches of trees, but not large forests. Capital will not even go into the work largely, of caring for the second growth of our timber lands, because as yet, far greater and quicker returns are realized from cutting down and making into lumber the primitive forests. The only way to start trees now which will make our future lumber supplies and at the same time be useful to our other farming operations by ameliorating the conditions of climate, is to establish an immense system of government forests. If one-twentieth of the area between the Mississippi river and the Rocky mountains could be planted to forests it would pay the country. In thirty or forty years the wood which could be taken out annually for use would repay all cost including the rent of the land, and the benefit to the country through having the summer rainfall and air moisture more evenly distributed, would more than doubly repay the total cost. Anything the state of Minnesota can do to incite the United States government to vigorously take hold of the building up of a system of national forestry, will be energy well spent. We must give especial attention to educating the people in general upon this subject, and in educating young men to be professional foresters.

(DISCUSSION).

Pres. Elliot: Now are there any points brought out in these papers you wish to discuss?

J. O. Barrett: I would like to make a little explanation about the difference between the two kinds of ash. Now the green ash, growing around the river bottoms and lakes, is not a fast grower compared with the white ash, but it is a smaller tree and in a few years the white ash will excel it.

Member: What is green ash and what is black ash?

E. H. S. Dartt: There seems to be a little confusion in regard to these varieties of green ash and white ash. I think, if I recollect right, the white ash has a rough root, whilst the green ash has a smooth root. I just want to say that I had five hundred ash trees set in the nursery a few years ago, and one of those very severe winters followed and they most all killed down; I do not know whether it was the green ash or the white ash, so it seems that the ash under some circumstances is not quite as hardy as it ought to be.

Pres. Elliot: That is not the Duchess, you know.

C. L. Smith: I was very much interested in the paper of Prof. Fernow, because it is exactly along the line that I have been at work on for a long time, and if you will look at the back numbers of our horticultural reports and our agricultural papers you will find that I have had a good many disputes in regard to this matter, and that I have always contended for the close planting of trees. I have urged it in season and out of season for years. During the year 1889 I distributed over the state over twenty thousand pamphlets, urging the necessity of action along the line of this paper. Now in the matter of forest fires; to be sure we have a law on our statute books covering that subject, and the very same legislature that enacted that law provided for the appointment of a state officer who should look after the enforcement of that law, and he has been from that day to this a clerk in the state auditor's office and he has never prosecuted or attempted to prosecute a man for burning up our state timber. Our people are universally blind in regard to the importance of this question, and it does not receive the attention it ought to receive, either in town or in the country. It has been brought before the legislature, but they pay very little attention to it, and there is no opportunity to discuss the importance of this question.

In regard to the kind of trees to be planted; for twenty years I have insisted that the willow was and should be the pioneer tree for tree planters. Now Mr. Barrett contends for two or more kinds; Prof. Fernow suggests that one or two rows of trees do not fill the requirements of forest planting; that there should be numerous rows of different kinds of trees mixed together. So far as the varieties of trees are concerned, I fully agree with Mr. Barrett that the willow and the ash give the best timber for the money of anything that ever was planted

on the prairie. One of the mistakes of our Timber Culture Act was that it provided for trees planted too far apart. Now so far as the evergreen is concerned I believe if properly planted and handled they will grow anywhere on the prairies of Minnesota, but I do not believe that a man can afford to set out a forest of evergreens if it is necessary to go to a nursery and pay out from eighty cents to one dollar apiece for the trees, but the nursery must be started on the farm. Although our state has been doing well in regard to this matter, it has not done what it ought to have done and we will suffer the consequences of that neglect. I memorialized the legislature of the state of Minnesota in regard to the opening of the Red Lake reservation, that it would be followed by the cutting off of millions and millions of feet of timber, but there was not a man in that legislature that would raise his voice against the opening of that reservation.

Year by year this thing goes on and these timber belts to the north of us are being wantonly destroyed, and I believe it is time for the people of Minnesota to rise up and say that no more of that timber which shelters us from the winds of the frigid north shall be cut away. I preached this all over the state of Minnesota last winter, but it is necessary that we should continue to preach it, and we should have an organized movement in favor of such legislation as will permit no further destruction of our forests.

I do not want to talk any longer; we could talk twenty-four hours on this subject and not exhaust it.

Now as to the matter of planting young trees; I have over there on the table a few copies of the Forest Tree Planter's Manual, and it has in it all the minute details for starting a nursery on the farm.

S. H. Folsom: Mr. President, the gentleman has struck the key note of this question. It cannot be discussed in ten, sixteen or twenty-four hours; it is too big a subject to undertake to do anything with it at all with the time we have at our command. The gentleman said he could talk twenty-four hours. I had prepared an article, and incidentally I came across his report, and I found I had used some of his arguments, and the more I examine the subject the more important it seems to become, and it requires more time than a few hours to state the matter as it should be stated. There is no use, as I see it, to read a few papers and then let the matter go at that. It seems to me that every society in the state should take it up,

and not only in this state, but in the Dakotas, Kansas and Nebraska, to cover the whole ground. I could talk a long time upon this subject, but I do not wish to take up your time.

One thing in regard to windbreaks. Only a few weeks ago I was in Richland county. The gentleman whom I visited there has timber on three sides of his farm. I was there when they had a blizzard. There was no storm there at all. I looked in the distance and there seemed to be clouds of sand and debris flying in the air so that you could not see the timber one-half mile away, but inside of this enclosure, ten acres only, everything was quiet. The trees had only a growth of six or eight years, there were no leaves, but still the protection was complete. I was surprised myself to see what protection these trees afforded; they were not evergreens, simply cottonwood.

This is a question that looks to me too large and too important for us to undertake to do anything like justice to it at a meeting like this where such a short time only can be devoted to its discussion; if we could have a day we could accomplish something.

QUESTION BOX.

(1). "Pinus Murrayana grows on the Rocky mountains and is plentiful in the Yellowstone Park at high elevations. Has this pine been tried in Minnesota? Might it not succeed on the western Minnesota prairies where white pine is tender without shelter?"

Pres. Elliot: That is the kind of pine they saw into lumber in the mountains.

(2). "Is the red pine (so called Norway) suitable for prairie planting?"

Pres. Elliot: It can be grown on the prairie.

Prof. Green: It is the best pine in the state next to Scotch.

HEDGES.

A BUCKTHORN HEDGE.

BY PROF. W. W. PENDERGAST, ST. ANTHONY PARK.

As far as my individual observation has extended there are but few ornamental trees and shrubs that are in the most exposed situation, absolutely hardy and reliable in this state. Scores of varieties like the soft maple, ash, box elder and cottonwood are usually reckoned among the ironclads, but in trying situations they are frequently injured and sometimes *killed outright* by our cold, dry winters, but there is probably not an acre of good arable land in Minnesota upon which the English buckthorn will not flourish 'mid all vicissitudes of weather, bidding defiance alike to the severest *frosts* of winter and the parching, dissolving *heats* of summer. When everything else in the garden and on the lawn is suffering from the touch of an unkind season, the buckthorn hedge, with the lilac for its almost sole companion, stands out fresh and unscathed, sound and bright to the very tip of every lithe and graceful twig. If it were not as beautiful as it is, its perfect hardiness and vigor should recommend it and cause it to be sought for by those—and "their name is legion"—who, in the past, thinking to adorn their homes with trees which the most inclement season could not scar, have been disappointed and found their hopes withering with the branches to which they had been looking for shade and protection.

While attending Phillip's Academy at Exeter, N. H., more than forty years ago, my attention was constantly attracted to the elegant hedge rows that bordered the sidewalks fencing the beautiful gardens with which that dreamy old New England village abounded. Nothing that I had seen in the way of ornamentation of gardens and grounds made so marked and enduring an impression as these neat and well trimmed hedges, and then and there I resolved that sometime in the dim and shadowy future if the "fates" should prove propitious, I would have a garden fenced in by a buckthorn hedge, little dreaming at the time that the garden and hedge would be on the sunset side of the Falls of St. Anthony, which my boy's eye had discovered marked upon my Malte Bruner Atlas in the "northwest territory", far beyond the confines of civilization. But the unexpected is what usually happens, and twenty years from the time my good resolution was formed in Exeter, I was planting a buckthorn hedge in front of my garden in Hutchinson, Minnesota. It may be well to remark here, that this work was done with much fear and misgiving. I had met with so many reverses before, where much had been expected that there seemed to be small reason for hope or encouragement, but unlike many previous ventures in arboriculture this was a most gratifying and complete success. Contrary to expectation the seeds germinated well; not a tree was lost in transplanting and but one has died in the twenty years that the hedge has been set, and that was in some way injured at the root. Aside from that one tree, not a branch has ever withered nor has the outmost bud ever failed to grow. It is more vigorous and hardy than the wild plum and bears pruning better. No matter how severely cut back it soon puts forth new branches and is as green and thrifty as before it felt the shears. It smiles with equal serenity upon the most savage blizzard of January and the fiercest heats of July. The

alternate freezings and thawings of March and April do not affect it, and the earliest winter finds it prepared for his coming.

Unlike the wild plum, no shoot is ever thrown up from its roots, and the gardener is spared the trouble and annoyance of constantly fighting sprouts, as he is obliged to do with many other hedges. It knows its place and steadfastly keeps it. It does not encroach upon the domain of anything else and permits nothing else to kill it out and usurp its place. A well set, well kept buckthorn hedge is not only a most desirable ornament to the garden or lawn, but is a complete and satisfactory fence as well. It is but little trouble to start one and still less to take care of it afterward, and it is passing strange that so few of the otherwise beautiful grounds in this enterprising state, owned by men of taste and means, are not further adorned and protected by a border which would cost so little and add so much to their attractions.

For the benefit of such as would like to grow a hedge of this kind, but are without experience and want directions, I will say buy a pound of buckthorn seed of James J. H. Gregory, of Marblehead, Mass—that is where I got mine—or some other responsible dealer, and, as soon as the frost is out of the ground in the spring to the depth of three or four inches, mix the seed well with about two quarts of finely pulverized sandy soil, and having rubbed it well with the hands in a pan of water to separate the three seeds which grow in each pocket, place the mixture in a box six inches square and six inches deep, in the bottom of which several holes have been previously bored for drainage, and cover the whole with half an inch of fine soil. Sink the box in loose soil in some sunny spot and occasionally sprinkle with soft water slightly warmed. Be careful not to water too frequently or too abundantly as in such case the seed will rot. If the season be rainy it will not need watering at all. The ground should be kept somewhat moist but not wet. About the first of May begin to examine the seed to see if it has sprouted. Do this at first every three days and oftener as the season advances and the soil becomes warmer. When the little white roots begin to protrude from the seeds make a garden bed about a rod square and sow the seeds half an inch apart and half an inch deep, making fourteen rows and sowing about four hundred seeds to the row. The plants should grow two years in the bed before being set in the hedge row. Cut back to half their length and set in parallel rows one foot apart, and plant one foot apart in the row breaking joint so that each shall be opposite the midway point between the nearest two in the other row.

Prune severely for the first few years so as to make the hedge thicken up well at the bottom. Here I made a mistake with mine in my anxiety to have a full grown hedge as soon as possible. I let it grow up too fast and as a result I have a hedge very thick and compact near the top but a little too open just above the surface of the ground. If it were to do over again I should not permit it to gain more than four inches in height each year till it reaches four feet and would keep it there ever after.

Where the hedge is trimmed the ends of the limbs do not show at all, but the leaves completely cover them and present to the eye a smooth and glassy wall of living green of whatever shape the taste of the owner may dictate.

To trim a hedge twenty-five rods long and keep it in good form through a season requires about three days work of a man equipped with a good pair of hedge shears.

A pound of seed should make 180 rods of hedge.

GENERAL FRUITS.

INFLUENCE OF STOCK ON THE LIFE OF TREES.

BY PROF. J. L. BUDD, AMES, IA.

Mr. President:—I am informed that I am down on your program for a paper on the above subject. In a very brief way I will only at this time call attention to the popular belief in the parts of Europe where horticulture was old before America was discovered, which is that all orchard fruits should be on their own roots or top-worked on indigenous wild stocks. What we know as root grafting has long been known but never practiced. Indeed this belief at this time is being narrowed down by many experts to the exclusive use of trees on their own roots.

Recently the noted author of "Propagation and Improvement of Cultivated Plants," Mr. F. W. Burbridge, wrote these significant words: "Looking at grafting from all points of view I am convinced that we should have had better fruit trees, and better and healthier and more prolific varieties in our gardens today, had grafting never been invented." Yet when compared with the general writings of this gifted author we find that he does not denounce the use of congenial hardy stocks. His sweeping statement was predicated on the fact that in Europe and America certain fruit stocks have come into general use which are not congenial to the varieties worked upon them, such as the use in this country commercially of French crab apple stocks, tender seedlings grown from scrub apples taken to the cider mills, French pear stocks, Myrobalan and St. Julian plum stocks, and Mazzard and Mahaleb cherry stocks.

TREES FROM ROOT CUTTINGS.

Mr. Burbridge, Mr. Robinson, and others, have called attention to the fact that in parts of France, Germany, Bohemia, North Silesia, and Russia, are found many sections where trees have been grown for the past one hundred years exclusively from sprouts or root cuttings. In such places the trees are healthy, long lived, and fruitful. On the other hand they call attention to the sections in which grafting on commercial stocks has been long practiced, where varieties once thought valuable seem to be running out, and where disease and the attacks of the fungi, are each year becoming more general. In such neighborhoods a change to trees grown from root cuttings would not be easy for the reason that the material for root cuttings is lacking as with us. The inducement for a change of policy is less urgent than with us as the climate is more equable and the orchard troubles are trifling compared with ours.

If our people can only be convinced that trees grown from root cuttings are best we can soon have an abundant stock of roots that will bring trees true to name. By the use of short roots and long scions we can cause the apple, pear, cherry, plum, prune and apricot, to root from the scion in nursery, and when set in orchard the seedling part can be cut away. At Ames we now have many trees on their own roots, and we are now starting trees in this way. The cuttings can be made and treated in the common way adopted with the blackberry and red raspberry, but

with the orchard fruits the cuttings should be made four inches long, and stuck like other cuttings, but with the top about three-fourths of an inch below the earth's surface. As the available material is yet scarce we are now growing the cherry, plum, *rosa rugosa*, and other things, under glass. In this way we can use short cuttings of smaller size, and secure an even growth with less than one per cent of loss.

The cuttings are planted thickly, in rows, in boxes eighteen inches wide, six feet long, and five inches deep. Holes are bored in the bottom for drainage, the bottom covered with a layer of moss which is covered with about three inches of common garden earth. The cuttings are stuck with the tops even with the surface and tightly packed. An inch of very rich earth is then sifted over the whole surface.

The boxes are set away in the cellar until the middle of November, when they are set under the sashes not over one foot below the glass. At this date the plants are from one to three inches above the surface, and by the middle of May they will run from six inches to a foot in height. Prior to planting in nursery the plants are hardened by exposure to the air and scant watering. We put them out after the hurry of spring's work is over, selecting a cloudy day if possible. But last year we had no cloudy days at the proper time, yet we lost very few plants. Our hot bed for this use is about forty feet in length, is covered with old hot bed sash, and is heated by hot water pipes. We use for the water heating a very small base burning conical boiler made by Hitchens & Co., for laundries and parlor conservatories. It consumes very little coal and has proven ample for heating the bed in the most extreme weather.

HARDY STOCKS.

For the Apple: We have no congenial native species of the apple for use as stocks such as are found in all parts of Europe. The wood of our native crab is hard and close grained and does not unite properly with one variety out of a hundred of those noted in our fruit books. The Siberian crab also differs in wood and its use must be confined to very few varieties. So far as known at this time the best available stock for topworking at the north are some of the Russian varieties such as the Anis, Hibernal, Recumbent, Bergamot and Sñken Leaf. If worked with short root and long scion so as to start roots from the scion, such varieties will, I believe, be extensively used for top-working in the near future. In Iowa the use of very hardy summer varieties such as Whitney's No. 20, Duchess, and Anissette, is not advisable for winter varieties. At Dubuque, Iowa, the Ben Davis on Whitney's No. 20 and Duchess becomes a fall apple, and the same effect is reported in other parts of the state. But at the north the use of varieties as late in season of fruit as the Anis or Hibernal has not resulted in hastening the maturity of winter sorts worked on them.

For the Pear: We have no suitable stock on which to crown graft or bud the pear which at present is obtainable in quantity. But the hardest Russian varieties may be compelled to root from the scion as worked on common French stocks, and can be used as stocks on which to work varieties slightly less hardy in tree with a better grade of fruit.

For the Plum: We are fortunate in having strong growing native varieties of the plum on which the hardy Russians and the best native varieties do well when crown grafted, budded or top worked. The Russian prunes and apricots we also find to do well on our native species.

For the Cherry: That we now have varieties of the cherry from east Europe hardy enough for the north is beyond all doubt or dispute, but worked on the commercial stocks they are liable to be lost by root killing. That it will prove best to grow them from root cuttings does not admit of a doubt, but at present trees on their own roots are scarce, and I believe we can profitably use two of our native species for root grafting and budding. The Wild Red Cherry (*Prunus Pennsylvanica*) has proven an excellent stock for budding. Trees now several years old have not outgrown the stock and the union seems perfect. The Dwarf Mountain Cherry (*Prunus pumilla*), as seen in its native haunts, does not appear to be well adapted for use as a stock. But we find the seedlings to be upright in habit and to bud as well as the Mahaleb. The plants can be grown thickly in nursery and set out the succeeding spring in rows for budding, precisely as practiced with the Mahaleb. At present I believe this will prove the favorite stock for the whole north and extreme northwest for the dwarf varieties of the Vladimir race which unite perfectly with its wood.

The conclusions so hastily and briefly outlined are the results of twenty-five years of experience and observation on both continents.

J. S. Harris: Now there are a great many things in that paper of Mr. Budd's that make me feel rather glad that he has written it. I had intended to write a paper on those points for this meeting, but have not had time to do it. The observations I have made in several places convince me that there are some varieties of apples that are being propagated by suckers and sprouts that are doing well, but that are a failure as grafted trees, and I do not know but what that gentleman is right when he says we would have been better off if grafting had never been discovered. There is a variety of apples that is propagated over in Wisconsin I know of, an orchard of perhaps one hundred trees, and there is not a grafted tree in the whole orchard. The oldest is forty-five years old, and the youngest sixteen or eighteen, and the man told us he had not lost a tree. The original tree looks as though it was still good for twenty years to come.

Pres. Elliot: I am well aware that there are several points in Prof. Budd's paper that we would like to discuss and bring out, but we are going to print that, and we can think it over, and when we come here next winter we can discuss it. We will try then, perhaps, to have something in that line.

AGRICULTURAL AND HORTICULTURAL TOPICS.

BY M. PEARCE, CHOWEN, MINN.

My paper will be on a few little things much neglected pertaining to horticulture and agriculture.

It is admitted by all who have had experience that top grafting the apple on the crab makes a poor union; nor is the crab on the apple any improvement. We have still another class of fruit that has sprung up during the last few years, and which is rapidly on the increase. It is known as the hybrid. It makes a poor union when top worked with either the crab or the apple. Now it stands to reason if those varieties as stated above are a failure, in the end the result must be the same when the crab or hybrids are grafted on the apple root, or the apple or hybrid on the crab root. When this matter is carefully investigated it is plain why such grafting fails.

It is a well known fact that all trees and plants of the same species take from the soil the same food in the same proportion. If the ash of the different species of trees and plants be carefully analyzed, it will be found that no two species contain the same inorganic substances in like proportion. The apple root never takes from the soil food in proper proportion for the crab or hybrid; neither do crab roots take from the soil food in right proportion for the apple or hybrid. The same rule applies to the food taken by the root of the hybrid. It is not in the right proportion for the apple or crab. Hence the union and the whole structure of the trees must be abnormal and liable to root killing, overbearing, blight and being short lived. Nature demands that all trees to make a perfect success must be grown on their own roots, or on those of the same species. In Minnesota we have about ten or twenty hybrid or crab varieties to one of apple. Under these circumstances it is not advisable to plant the seed to grow roots to graft, or with the expectation of getting good fruit or hardy trees. The chances are that from 90 to 100 per cent. will be hybrids of the second crossing, possessing but little vitality.

The seed of the cherry crab fertilized by the standard apple will make a true hybrid—hardy and vigorous—a perfect stock on which all true hybrids may be worked.

To grow good nursery trees—well rooted and stocky—they must have space to grow at least from 12 to 15 inches apart in the row. Cheap and slender trees from 5 to 6 feet high, grown in crowded rows a few inches apart, when transplanted to the orchard, can be made a success by cutting them back close to the ground, and allowing three sprouts to grow above the splice. One of the best and most productive orchards we know of in the state was grown in this way. This subject we will again allude to in its proper place.

As soil and manure are two of the great essentials in growing fruit and all other crops, a little more space than usual appropriated to these subjects will not be out of place. The soil which we cultivate is composed almost entirely of pulverized rock and stone with all their minerals.

The balance of the soil is decayed matter, animal and vegetable.

Soil is divided into two parts, organic and inorganic. When it is exposed to fire the organic part passes off as gas or smoke. The inorganic remains as ashes.

There is a great difference between a fertile soil and a rich one. A fertile soil contains all the plant food in a soluble form, ready for immediate use. A rich soil contains all the plant food, but most of it is in an unprepared condition for present use. It is an easy matter to exhaust a fertile soil. A few crops of the same kind in succession will do it. Bad cultivation exhausts the fertility of the soil. Dairy cows and growing stock of all kinds are exhaustive to the fertility of the soil. They both require a large amount of lime and phosphoric acid for the growing and replenishing of their bones. This is also required for the milk of the cows. These substances are taken from the green pasture at the expense of the soil. The manure from such stock is of but little value for fertilizing.

In all cases where the land is cultivated and crops taken from it, the manufacturing of plant food becomes a case of necessity to keep up the fertility of the soil, by returning the same amount or more plant food than was taken from it. To do this we must bring to our aid stock of all kinds and make the saving and composting of all raw or green manure as much of an object as that of growing the various crops. This should be done in a scientific way, and so as to get the whole contents of the manure, and not lose from the half to two-thirds of its most valuable qualities, which is too often the case.

Those who keep horses, cattle, hogs and other stock will have all of the material to make the very best fertilizers. This should be done by composting in the following way: Level off a piece of ground as near your stable as possible. First put down a layer of horse manure, then build up with all kinds of mixed manures, also bones, carcasses and occasionally a load of peat. On this throw all the liquors from the drains, soap suds, etc.

The agents which produce fermentation are air and water. The heap should be moist, if allowed to become hot and dry, the decomposition of the nitrogenous matter, results in the formation of carbonate of ammonia, which escapes into the air. This is a great loss. If the heap is sufficiently moist the fermentation is slow and instead of carbonic acid being formed and combining with ammonia, it will stop at the formation of ulmic and humic acid, and these acids with ammonia will form ultmate and humate of ammonia, and compounds of potash and soda.

By the application of water the heat can be controlled and should not be allowed to exceed 70° or 80°.

Steaming and the escaping of gas indicates over heat. Care must be taken not to supply water in too large quantities so as to cause a loss of liquor.

A compost heap should always be under cover. Such a heap as we have described when well rotted, will contain every variety of plant food in concentrated form. Such manure when applied to the moist soil dilutes, and is ready for immediate use if applied at the proper time, and it is of more value to the growing crop than ten times its amount of green manure. This kind of manure will be noticed in connection with soils, which follow. Soils are of several kinds, and are classified and known under their proper headings. A sandy loam contains from 60 to 80 per cent. sand, the balance being clay. There is a large amount of this kind of soil in Minnesota. It is usually rich in all the mineral substances, and is

always very fertile. It is loose and easily worked, stands excessive moisture and drought, with as little injury to the growing crops as any other soil. It is adapted to all agricultural crops and is the first to mature them. Some varieties of strawberries, such as Crescent, Warfield, Countess, Windsor Chief and many others do well on this soil.

Where a sandy loam contains 60 per cent. sand, apples, grapes and currants do well, and this is probably the best for growing nursery stock and cuttings of all kinds. On such soil trees and plants are always well rooted, much better than those that grow on clay. A sandy loam is not the best to hold plant food, especially if the season is wet. Compost should always be used and applied to the soil just before the ground is seeded, planted, or set to plants.

Intermediate or loam contains from 40 to 60 per cent. sand, the balance clay. It is usually very rich and fertile and is adapted to the growing of all grains and fruit. The soil should be frequently ploughed and stirred, which will greatly increase the fertility. On the lighter portions of this soil compost should always be applied as on the sandy loam. When the soil contains from 30 to 40 per cent. sand, and the balance clay, it has the power of fixing and holding all kinds of manure and soluble plant food both for present and future use. We consider this soil the best for apples and all kinds of fruit. It is rich in all the mineral substances which are essential in growing fruit. This soil is found in large quantities in Minnesota. There are thousands of acres of it around Lake Minnetonka, which in time will become large commercial orchards and vineyards. The fruit lands around Lake Minnetonka have natural advantages over other parts of the state, being situated on a large lake and near to two large cities, with railroads to ship to all points.

Growing apples in Minnesota is not by any means an experiment. The age of some fruit trees and the amount of good fruit they have produced are conclusive evidences of what can be done by intelligent growers.

Eastern ideas of growing apple trees with trimmed up trunks has been discontinued by experienced growers in Minnesota. Their trees are all grown with low tops, and are allowed to branch at or near the ground.

In conclusion on this subject our mode of growing permanent and fruitful orchards is as follows: Root-graft each variety on its own root or species. Give them in the nursery plenty of space, sun and air. Allow them to take their own form and head low. Transplant to the orchard when two years old. Set them in the same position with regard to the points of the compass, as they stood in the nursery, placing them one rod apart each way. Give them good cultivation, and allow no grass to establish itself in the orchard.

Each spring or fall all young orchards should have a light dressing of well rotted compost, and this should be increased each year as the trees attain size and come into bearing.

We consider this of vital importance to the health and life of the trees. The manure contains all the elements that combine with the minerals in the soil and produce plant foods for the trees, which the roots take in various proportions. If any of the foods are not present in the soil, or are not in sufficient quantities, defective fruit and wood must be the result.

It is very necessary that we should know what kind of soil we have. This can be determined in the following way: Take about two pounds

of average soil, and separate the coarse from the fine with a sieve. Then weigh out a pound of the soil which passed through the sieve and place it in a fruit jar or some other vessel. Add water until it becomes quite thin. Give it a good shaking and allow it to settle for a moment, then pour off the top. Repeat the application of water and the shaking until nothing is left but the sand.

Dry and weigh the sand. The percentage of sand in the original soil will then be easily determined.

WILD FRUITS NATIVE IN NORTHERN MINNESOTA.

BY DR. JAS. R. WALKER, ST. ANTHONY PARK.

I presume that this paper is asked for to assist in estimating possibilities in production of domestic fruits, and that relative facts, such as the modifying conditions of elevation, climate, soil and the character of the vegetation, are acceptable.

The only part of northern Minnesota that I have a personal knowledge of is Cass county, and the adjacent parts of Beltrami and Itasca counties, which, because of its physical features, may be called the Itasca region.

It has an area of 4,000 square miles, nearly one-fourth of which is water, for it is a lacustrine region and has within its borders some of the finest lakes and rivers of Minnesota.

Its average elevation above sea level is 1,500 feet. That this elevation may be more readily compared I will state that Lake Itasca, in this region, is 1,500 feet, while Lake Pepin is but 664 feet above sea level, and the Mississippi river at its source is 1,592 feet, while where it leaves the state it is but 620 feet above sea level.

This region has the coldest climate in the United States, outside of Alaska, the mean annual temperature being 34 degrees above zero, which is 8 degrees colder than St. Paul, and one degree colder than St. Vincent, while it is 10 degrees colder than Sitka in Alaska.

The maximum temperature usually occurs near the first of July, the highest observed being 103 degrees, and the minimum usually occurs about the middle of January, the lowest observed being 52 degrees below zero, making the range of temperature 155 degrees.

The mean temperature of the latter half of May, of June, July, August and September, the months when vegetation is growing and ripening, is 60 degrees, with a mean daily range of 29 degrees.

The earliest killing frost observed occurred on the 25th day of September, and the latest on the 28th day of May. This gives of time free from frost about a month longer than at St. Vincent or Moorhead in the Red River Valley, which is probably due to the large amount of water surface.

The annual rainfall is about 27 inches, June, July and August each having an average of about 3 inches, while September and October are the driest months of the year. Thunder showers are frequent, while long rainy spells are rare, and hail storms very rare. The first heavy snow usually remains on the ground until April. The ice leaves the larger lakes about the 15th of May.

There is an average of 170 clear days during the year while St. Paul has but 100. The average of clear and fair days is 300, while St. Paul has 292. There are more days when the sky is brilliant and the air clear, dry and bracing, than there are in the southerly part of the state.

The prevailing winds are westerly and are generally mild, but in the forests there are well marked paths of destructive winds, which generally blow in straight lines, some, however, were the whirling winds called cyclones.

The geological formation of this region is drift overlaying archaean rock. The lower stratum of the drift is a blue-grey clay, from a few inches to many feet thick. Over this clay is a thick stratum of sand, gravel, boulders and yellow clay in a confused mixture, which forms the subsoil of this region. This is covered by a loamy black soil, varying from an almost imperceptible amount to a depth of a foot or more, being thinnest on the sandy uplands and deepest on grass lands.

The land surface of this region is divided into uplands and lowlands. The uplands are rolling, broken and interrupted by the lowlands. They are covered by forests, the character of which appears to be determined by the subsoil. A subsoil of sand produces principally black pine. If it is of sand, gravel and boulders Norway pine predominates, while white pine flourishes on a clayey subsoil. These are conveniently designated as black pine, Norway pine or white pine lands. They are not confined to any part of this region, but the black pine lands are most abundant in the southerly, Norway in the central and the white pine in the northerly parts. Besides these lands there are limited tracts near the larger lakes and rivers called hardwood points, that have a much richer and deeper soil.

Where the native forests are undisturbed on the pine lands, besides the pine, there are a few scrubby oaks and clumps or thickets of poplars, and an occasional white birch. On black and Norway pine lands there is a meager undergrowth which becomes luxuriant on the white pine lands and hardwood points.

Where the native forests have been removed there springs up a dense growth of oak, birch, linden, elm, poplar, hazel and young pine. But apparently the young pine after a few years overtakes the other growth and shades it to death.

Sugar maple, elm, linden, white and yellow birch, oak and iron-wood grow on the hardwood points, rivaling the trees of the "big woods" about Lake Minnetonka.

Ferns are everywhere prominent among the herbaceous growth, while forage plants are scanty, except the wild pea, which is plentiful on white pine lands and hardwood points, and makes a fodder that horses and cattle relish.

Flowering plants are many, varied and magnificent when in bloom.

The lowlands are divided into swamps and grass lands. There are tamarack, cedar, spruce and peat swamps; the most being tamarack, which increase in number and extent from the southeasterly towards the north-easterly part of this region.

The grass lands are the beds of former lakes, and the borders of receding lakes, and savannas near rivers. The soil on these is usually deep and

rich, but damp. They are occupied by bluejoint and reed grasses, which grow in astonishing luxuriance.

Many small lakes, and the shallow parts of many of the larger lakes are almost filled with a slimy muck, in which wild rice grows producing thousands of bushels of this very nutritious food.

The vernal growth of this region is so rapid and vigorous that it is bewildering to one accustomed to the spring changes of the latitude of Illinois, for it is more like that which one would expect in the subtropics rather than this northern region.

The native edible fruits growing wild in this region belong to the heath, rose, honeysuckle, saxifrage, grape and nightshade families, named in the order of their importance and quantity.

Vaccinium Pennsylvanicum, the blueberry, is found on the black and Norway pine lands. It attains its greatest perfection in the northern part of this region, where it is usually from six to ten inches high and fruits abundantly, bearing large berries of fine flavor.

Vaccinium nigrum, the black blueberry, occurs sparingly among the former, being conspicuous by its shining black fruit. It is inferior both in fruitage and flavor to the blueberry.

Vaccinium Canadensis, the Canadian blueberry, is found in damp shady places on Norway pine lands. It grows from eighteen inches to two feet high, with a scanty fruitage, the berries being oblong and smaller than the blueberry; they are sweet, but with little flavor.

Vaccinium caespitosum, the bilberry, is found on Norway pine lands in the most northerly parts of this region. It is from two to four inches high. Its fruitage is abundant, the berry being pear shape and about the size of the smaller garden pea; they are subacid with a pleasant flavor.

Oxycoccus palustris and *macrocarpus*, the small and large cranberry, are found in the swamps that have a spring overflow, the former being perhaps the most abundant. The fruitage of both varieties is good in favorable seasons, but a dry winter and spring reduces the crop very much.

In some of the more northerly swamps there is a cranberry with a fruit of a greater breadth than length, and of a grey color when ripe. The fruitage is scanty, but the berries have a delicious flavor. I think this berry has not been recognized or named by the authorities.

Prunus Americanus, the wild plum, is found on white pine lands and hardwood points. It is rarely more than a shrubby bush. The fruitage is fair, the plums generally being small, acid and unpleasant. But some bushes bear plentifully of sweet and pleasant fruit. The fruit varies in color from greenish yellow to light and dark red. The bushes are subject to a disease which produces a knotty condition of the smaller branches; and an insect deposits its eggs on the under sides of the leaves, which results in numerous small elongated galls that destroy the leaves, and the curculio destroys a large amount of the fruit.

Prunus pumila, the sand cherry, is found on black pine lands. It is a shrub usually about eighteen inches to two feet high, rarely branching. The fruitage is abundant, the berries being almost as large as the smallest plums, and when ripe, black and coated with a dark bloom; they are sweet with an astringent taste.

Prunus Pennsylvanicum, the red cherry, is found on white pine lands, where it grows to the height of ten to fifteen feet. The fruitage is good, the cherries being in umbels of from two to five, as large as the common red currant, and much the same color when ripe; they are of a pleasant acid flavor.

Prunus Virginica, the choke cherry, is found on white pine lands and hardwood points. It is a shrub of three to six feet high. Its fruitage is abundant, being clusters of berries as large as the marrow-fat pea; which when ripe are a shiny black with a sweet, strongly astringent taste.

Rubus villosus, the low blackberry, is found on white pine lands and hardwood points. The plant is scarce and stunted, and the fruitage is scanty, the berries being imperfect and bitter.

Rubus Nutkana, the large flowered raspberry, is found on white and Norway pine lands where the native forests have been removed. It is scarce and of scanty fruitage, the berries being much like the red raspberry.

Rubus strigosus, the red raspberry, is found on all the uplands of this region, but it is most plentiful on the hardwood points, where its fruitage is abundant. One variety of this berry found in this region has canes without prickles; these grow erect, from two feet to thirty inches high without branching the first year. The second year they branch and fruit well; the berries are of a rich, sweet flavor. These three varieties of raspberries are subject to a fungoid disease which appears as a rich brown colored smut or rust on the leaves.

Rubus chamaemorus, the cloud-berry, is found on the northerly exposure of shaded Norway pine ridges in the extreme northeasterly part of this region. It is a rare, herbaceous plant, bearing but two or three amber colored berries about the size of the red raspberry, which are sweet and have a peculiar pleasant flavor.

Rubus triflorus, the dwarf raspberry, is found on shaded portions of Norway and white pine lands, which have a northerly exposure. It is a solitary, herbaceous plant bearing usually but a single berry about as large as the red raspberry, of a translucent red, without bloom; it is sweet and has a faint raspberry flavor.

Rubus Articus, the Arctic raspberry, is found in peat swamps where it grows independent of the soil, its roots penetrating but two or three inches into the damp moss. It grows in patches, and is from one to two inches high. It usually has a single leaf, and bears only one flower, which is an inch and a half wide and of a rosy pink color, with a rich perfume resembling that of plum blossoms. When in bloom a patch looks as if it were a lot of plucked roses scattered on the moss. The fruit is larger than the red raspberry, and when ripening changes first to a milky white and then to a waxy red color; it is sweet and has a flavor like the mulberry.

Fragaria Virginiana, the large round strawberry, is found on all of the uplands and on the borders of the grass lands, but is most abundant and fruits best on recent ice-formed sandy soil adjacent to sandy beaches of lakes. The fruit is as large as the common cherry, sometimes larger, and when ripened in the sun is highly colored, sweet and richly flavored.

There is another strawberry found mingled with the above, but distinctly differing from it. I did not learn its name. It bears a long and slender berry, smaller but more numerous than the other, which hangs on the stem until it dries up. It fruits best in shady places and is not easily

affected by dry weather, or by the blight which infests the leaves of the former quite badly at times.

Crotagus, the red haw, is found on hardwood points, where it grows ten to twelve feet high.

Amelanchier Canadensis, the juneberry, is found on white pine lands and hardwood points growing from six to ten feet high. It fruits abundantly, bearing clusters of berries, which when ripe are as large as the Delaware grape. They are black with a dark bloom, sweet, juicy and with a pleasant flavor.

Ribes cynosbati, the prickly gooseberry, is found on white pine lands and hardwood points. It has a vigorous growth, and fruits well; the berries being apparently free from the rust or smut. When ripe the prickles on the berries become hard and make them unfit for sauce.

Ribes gracilis, the smooth gooseberry, is found on white pine lands and hardwood points. It is of a more slender growth and scantier fruitage than the former, and its berries are subject to the rust.

Ribes Floridum, the black currant, is found in damp, sunny places on white pine lands. The plant is scarce, the fruitage scanty, and the berries have a disagreeable flavor.

Ribes rubrum, the red currant, is found in the same localities as the black. It is a rare plant with scanty fruitage, but the berries have a very pleasant acid flavor much like the cultivated varieties.

Sambucus racemosa, the red berried elder, is found on hardwood points, where it grows from eight to ten feet high, and fruits abundantly.

Vibernum lentago, the black haw, is found on damp rich soil on hardwood points where it fruits well.

Viburnum opulus, the high bush cranberry, is found in much the same localities as the black haw, growing from four to six feet high, and fruiting well. It is quite plentiful in the central part of this region.

Physalis grandiflora, the wild tomato, is found on the dry rich soil of hardwood points, especially where there has recently been a fire. The fruitage is scanty, the berries being about twice the diameter of the ground cherry, of a reddish green color, and rather an insipid taste.

Physalis Virginicum, the ground cherry, is found in dry mellow soil of sunny exposure on the hardwood points. The plant has a rapid, vigorous growth with an abundant fruitage. A fly deposits its eggs on some of the berries when quite small; the worms hatching from the eggs, penetrate the berries and cause them to drop just before maturing, thus destroying a large per cent of the fruit.

Vitis ripens, the winter grape, is found on hardwood points. It has a rapid and vigorous growth, but most of the recent canes are killed by the frosts of winter, though some survive. A late spring without a late killing frost is most favorable for fruitage, when it bears good clusters of small black berries with a rich foxy and very acid flavor, which is mellowed by the first autumnal frosts.

Vitis aestivalis, the summer grape, is found on sunny exposures of dry hardwood points. It is rarer than the winter grape, and apparently not so hardy, for I have never seen an entire cane survive the winter. The fruitage is scantier and the clusters more imperfect than the former. This I think is due to its habitation, for owing to the dryness of the soil

and the sunny exposure it is influenced to bloom so early that late frosts are apt to injure the swelling buds. These grapes are subject to the downy mildew, which sometimes destroys much of their foliage.

On the shore of Cass lake, west of the mouth of the Turtle river, near where there was formerly a mission of the Roman Catholic Church, there is growing a grape with a berry a little larger than the Delaware, flavored like the Virginia Seedling, and colored like the Concord.

It grows on the light sandy soil that has been pushed up by the ice of the lake. The vine appears vigorous and hardy, some canes surviving the winter. The fruitage is good, but the clusters seldom perfect.

This I concluded was either an imported grape or one of the natives developed by cultivation.

This concludes the list of native edible fruits growing in this region, so far as observed by me. There may be others.

Mr. Schoolcraft, in his classical work on the exploration of the head-waters of the Mississippi, says that the huckleberry is found in this region. I doubt this, though it may be so.

In this paper I have endeavored to mention such matters as not only indicate the native wild fruits, but the elements which would influence the growth of domestic varieties in this region, and with this intention it is respectfully submitted.

DISCUSSION.

M. M. Frisselle: Mr. President, I think it is in order to give a hearty vote of thanks to the Doctor for his very able and instructive paper.

The motion was seconded and carried.

J. T. Grimes: In all that list of fruit you have named as growing in the state is there anything that is worth transplanting here for profit?

Dr. Walker: No, sir. I did not look at it in that way particularly. When I was investigating the matter it was simply to find out what was there. In preparing this paper I simply prepared it with an idea of perhaps being able to form an estimate of what could be grown there in the line of domestic fruits. The only thing I can think of of value is the cranberry that I mentioned, which I think is not named, and the smaller blueberry that grows in the northern part. Those two and the small cane raspberry I think would bear investigation very well. I think I would put the raspberry first. It is a little raspberry that grows about _____ high with canes in proportion, small, branching the first year and fruiting the second year, growing a fruit that is deliciously sweet and highly flavored.

J. T. Grimes: Is that variety not found as a bush?

Dr. Walker: No, sir. It is a shrub, not a bush. It grows as the ordinary cultivated variety does, except that it has a single straight cane which grows up and stands perfectly straight.

J. T. Grimes: The reason I ask that question is that a number of years ago I received a plant or two from Mr. Tenney that was called a flowering raspberry, and it came very highly recommended on account of its fruit, and I planted it and it has grown ever since; I could not get it out of the ground. It is simply a shrub and I have never yet seen any fruit, not even a flower.

Dr. Walker: Although it does fruit, I do not think it would pay to transplant it.

C. L. Smith: I have observed the small caned raspberry for three different seasons, and I am certain it is worth experimenting with down here. Its hardiness, its productiveness and its quality of fruit make it desirable. I have twice made arrangements with parties to send me some in the proper season, but so far have failed to get them. I think it would be well to have them tested at our experiment station. It had the appearance to me of being of value if cultivated. Its habit of growth is very much like the old purple cane raspberry.

J. S. Harris: Of the fruits he has mentioned in that long list those of the most value and interest I think are first the sand cherry and then the juneberry. I think there are some varieties of the juneberry that with proper culture could be improved until it will give us a very valuable fruit. They have up in Manitoba varieties of it that are very much esteemed, and from reports I have had from there the fruit is larger than that which grows here.

I believe there is something in the sand cherry that will sometime make it a valuable fruit, and I think it would be well for our experiment stations to get hold of the best they can and give it cultivation, and by propagation through seeds and other ways I think it could be improved. We have some native fruits that it would pay us to take care of and cultivate, and we could certainly make it a fruit of great value to us and to future generations. I think this society should take some action in regard to preserving and improving its native fruits, and we cannot too soon go to work. There are a great many varieties that were known here twenty years ago that are now lost forever, and unless this matter is taken hold of very soon we will have no material to start with. We ought to go into it at once, even if it cost us considerable time and money.

C. L. Smith: In regard to this juneberry. Out in Montana I found the juneberry under the name of sand cherry. They were brought in by wagon loads and sold for three dollars per bushel. The bushes growing from four to six feet in height and so loaded with berries that they would bend to the ground, and I could not see any difference between them and those grown in Minnesota. They are a dark purple, and out there they grow quite large, sometimes one-half inch in diameter, and the bushes are literally loaded with fruit.

A member: Do you know anything about the white raspberry?

J. S. Harris: I have seen it in this state, but it is a very shy fruiter, but I have not seen it for the last fifteen or twenty years.

Dr. Walker: In regard to the Arctic raspberry I spoke to you about, it is a very hardy plant indeed. The bushes stand up over the snow looking like a stubble field, so they are not protected by the snow and I think it does not winter kill. In speaking of a disease that attacks the different varieties, I do not know whether that variety was attacked as much as the others or not. The place where it was most plenteously found is near Leach lake. The only difference I could see between those and the common wild red raspberry was that they did not have as much bloom on them as the wild raspberry and were much sweeter.

Geo. J. Kellogg: There is one good point in this valuable paper. We are glad to know that the curculio, black rot and rust got up there before we did—downy mildew and everything else.

Col. Stevens: In regard to blueberries, I would ask the Doctor how many different varieties there are. The whortleberry and huckleberry belong to the same family. I was surprised, last July, to read in the American Garden what I did in regard to the whortleberry and huckleberry. I never knew before that there were over eighty varieties. I got acquainted with them all the way through the Pacific slope and I had no idea that the varieties exceeded more than one fourth that number.

Dr. Walker: Of the blueberry I think there are some twenty varieties, and of the huckleberry there are three times as many, and we have most of the varieties of blueberries in this state. I understand there are some huckleberries west of Minneapolis and some on the Mississippi river below here, according to

Prof. Winchell. I did not think there were any huckleberries in that part of the state. There are a number of varieties of blueberries that I spoke of. The best blueberry of all grows on high, sandy points in the northwest part of the state. It grows on little bushes, six to ten inches high, that fruit so well that at times I have seen it, in looking as far as across the street, it would look like a bed of blue flowers. I remember once an Indian and myself sat down a half peck pail and picked it full of berries without moving to pick, and the berries are much larger than those we see here.

HORTICULTURE ON THE FARM.

BY CLARENCE WEDGE.

In considering the place that horticulture should take upon the farm, we must keep in mind the general character and situation of the farmer. Whatever may be the joys and blessedness of ideal farm life, the average farm is a busy, practical, bread-winner's workshop. I am painfully impressed as my acquaintance with the farmer increases, that his days are long enough, his burdens heavy enough, and that horticulture when it takes its place upon the farm must come in such a form, that it will be a lift and not a weight, a help and not a hindrance to the general and legitimate farm work.

It is in this spirit that I have prepared a few notes and suggestions that have occurred to me in my own experience as a soil tiller.

First, in regard to shelter. The desolate, forsaken, wind-swept condition of the average farm home is one of the saddest sights that meet my eyes. Cruelty to animals is bad enough, but cruelty to wife and children, stock and all by leaving their habitations exposed year after year to the blasts of this icy wilderness, no amount of press of farm work will excuse. Moreover the needs of the case, and the time, feed and labor saving sure to follow the proper application of horticulture, demands that this work be most thoughtfully and thoroughly undertaken.

While it is desirable that some protection should be had from all directions, the greatest care should be given to a thorough protection from the west and north; upon these sides the shelter belt should not be less than four rods wide. It goes without saying that the best material for such a belt is some variety of evergreen, and its incomparable beauty and the ease with which it can now be obtained should place it within the plans of every self-respecting farmer. The willow, and in southern Minnesota the Lombardy poplar will make a quicker temporary shelter, and they may be used while the evergreens are growing. One of the most complete and perfect wind breaks I have seen was made by planting willows two feet apart in rows six feet apart, allowing them to grow to some size, and then cutting them to within three feet of the ground; the dense growth of sprouts that sprung from the stumps were almost as impervious to wind as a belt of evergreens. It is with some hesitation that I

mention the Lombardy poplar. It is about as worthless as a permanent tree as any that could be mentioned; but, out of gratitude for the protection it has given me for the past twelve years, I will state that for a temporary wind break it is good and perhaps the quickest grown of any.

It must be remembered that one of the uses of a wind break is to catch and hold the snow drifts away from our buildings, driveways and fruit gardens, and that unless such wind break be at least six rods wide it should be placed at a good distance from anything that will be injured or obstructed by the drifts sure to be at the sides of a narrow belt of trees. Thoughtlessness in this matter has cost many farmers of my acquaintance needless labor and loss. I confess that I leave this branch of the subject with reluctance. Our farmers may have wasted much time and money in the orchard and garden, but I am confident that they have received a better return for every hour of time and dollar of money put into the shelter belt, than for the same amount spent in the common routine of farm work.

A few matters in regard to the farm fruit garden will next be considered. In order that fruit may profitably be raised upon the farm the first requisite is that the trees and bushes be so planted and arranged as to admit of the largest possible use of horse cultivation, and that farmers disabuse themselves of the idea that grapes, currants, strawberries, young orchards, etc., can be profitably grown among weeds and bluegrass. Everything from strawberries to apple trees should be planted in long rows a liberal distance apart. I am especially impressed with the belief that farmers will be more likely to give their orchards needed cultivation if the old system of planting in squares be abandoned and the trees be set rather thickly in rows three rods apart. Among the advantages of this method of planting I would mention—

1st. The apple on many if not most of the farms of the state is of uncertain hardiness, the land devoted to orchards planted in the usual way is rendered almost worthless for crops from the inconvenience of working horses among the trees; hence, if the trees die or fail there results a complete loss. While on the contrary, if the apple trees are planted in rows wide apart the space between the rows can be profitably used for potatoes, garden, squash or corn, and the land occupied by orchard be made to pay a fair rental independent of the life or productiveness of the trees. 2nd. A better circulation of air is allowed among the trees and healthier orchard conditions secured. 3rd. Where but few rows are to be looked after fewer trees will be injured by whiffletrees and cultivators. 4th. If the rows run north and south and thick planting in the rows be made, the top of one tree will shade the trunk of its next neighbor and danger from sun scald be somewhat prevented.

The raspberry, blackberry and currant in most situations and in our usual dry seasons will do much better if a heavy mulch instead of a cultivator be used to keep down the weeds. My experience in this matter has been decisive. The straw or marsh hay needed for such a mulch is still on the average Minnesota farm almost a waste product, and its application to small fruits is the cheapest method of securing the moisture necessary to the best development of fruit. I cannot leave the consideration of the fruit garden without taking the opportunity of recommending the De Soto plum, like the asparagus in the vegetable garden it is

grown with the least possible trouble, is as hardy, healthy and productive as the currant, and in quality takes its place at the head of the list.

The ornamental plantation is the last to be considered. If the planting for shelter and fruit has been thoughtfully done, but little will be needed to complete the beauty of the farm premises. It is a great and common mistake to fill the space between the dwelling and the highway with a mixed multitude of shrubs and trees, a clean lawn without a break would be far preferable. This should be the grassy romping ground for the boys and girls where ball, tennis and pullaway hold their summer carnival. This open space also affords a view of the road with its passing teams to vary the monotony of farm life. If the passion for planting everything that comes to hand must be exercised, let it be at the rear of the dwelling where a back ground of green and a cool retreat is very desirable. A few high trimmed white elms scattered about the house and yard with some heavy groups of evergreen flanking either side of the house, some shrubs and vines about the doors will complete the adornment of the farm home.

With the advent of cheap and permanent iron fencing, it appears to me that the days of usefulness for the willow hedge along the roadside have come to an end, and that in the future we should use our hardiest forest trees high trimmed and planted not less than forty feet apart for the adornment of our highways.

In closing I will say that I can think of nothing we can do that will assist the farmer more in making progress in the art of horticulture than by publishing, what has already been proposed, a Manual of Horticulture; and through the medium of our membership and the farmer's institutes securing its wide and general circulation.

DISCUSSION.

Pres. Elliot: Any questions to be asked on this paper?

Prof. Waldron: I would like to ask one question in regard to construction of wind breaks. Would you have a solid wall of evergreens or two or three broken rows?

Clarence Wedge: If the evergreens are planted row after row say four to eight feet apart they will be tight enough to prevent the wind sweeping through. My method of planting is to plant a double row; it makes a more perfect break.

Pres. Elliot: I have not taken up much time at this meeting, but I have an idea in regard to wind breaks. I think the rows should be alternate; that is, I should start the rows far enough apart so that each tree can grow and make a perfect tree. You all know that when you put a tree out on the prairie it is a perfect tree. If you plant in alternate rows you can plant them far enough apart so as to give each tree a chance to develop. If you plant Norway spruce there should be not less than thirty feet between the rows; forty feet would be better, then put them

far enough apart the other way, not exactly opposite, but set them the half distance between, and they will make just as effective a windbreak as can be grown. That would be my method of planting a windbreak.

Clarence Wedge: That is my method, but I plant double rows.

Dr. Frisselle: Why not plant some fruit trees along the highway instead of maple. In some countries, in Spain, for instance, they plant all the roadsides with fruit trees. They grow an immense quantity of them. In some countries they plant nut trees along the road. Why not plant those?

Wm. Somerville: I think the theory is good and the practice is good. In surrounding my orchard with a windbreak I have simply planted evergreens eight feet apart, and they are a solid row and now sixty-five feet high, and every tree is perfect from the ground up, and I think where they are set eight feet apart in one row and well mulched, you can get as perfect a break as with a double row. Mr. Harris was at my place and I think he will say he never saw anything nicer, and in that form I have got my orchard surrounded, and I cannot see any difficulty in this circulation of air that is so much talked about, and I know I have raised as many apples as any man in Minnesota. My enclosure is ten acres and it is cut right in the middle with Scotch pine, and no wind affects me on that open prairie and the wind does not blow the apples off, and for that reason I am decidedly in favor of protection for an orchard.

Pres. Elliot: How far back is your windbreak from your trees?

Wm. Somerville: I should say from fifteen to eighteen feet.

Pres. Elliot: On our broad prairie where the wind has full sweep how would it affect the trees in regard to breaking down if the snow should blow in there?

Wm. Somerville: The fact is I have never had any trouble in that way. I am not afraid of the drifts. I have a good many trees around my place, but I have no drifts there. I think he is hardly a good citizen that has only one board between himself and the north pole to keep away the wintry blast, and I think every person as a farmer should plant out some trees to shelter his house and his stock.

J. S. Harris: During the worst storm we had this winter I was at Mr. Somerville's place and he asked me to go out to his barn. I went out between two rows of evergreens. I said "The storm has stopped." That walk from the house to the barn

was so warm, free from snow and entirely free from wind that I suggested the storm had stopped. When I got back to the house I found it was not so. Every farmer should have a shelter of this kind, and two rows of evergreens set like Mr. Somerville's will soon afford that shelter.

C. H. Gordon: I presume no one knows better the advantages of having windbreaks than we old settlers of the backwoods, when it was all a large forest and we did not suppose we ever would have big drifts and bad roads. But that time has come.

In regard to these windbreaks. It is a very nice thing, indeed, to have plenty of windbreaks around our house and barn and all our walks, but those tall sixty-five feet windbreaks around our orchards I cannot understand how they work well. My orchard is not sheltered with timber except on the south and east, and where the trees come up to the edge of the timber they are not bearing worth a cent, but back a little farther they are much better. I have fully made up my mind to cut off that timber for four rods for the benefit of the trees. Protection is one thing and high windbreaks another.

Prof. Waldron: I was just going to say that engineers in making breakwaters, instead of putting in a solid wall, put in rows of piles four to six feet apart, and where they make a solid breakwater the waves go right over it, and it occurred to me that that same theory might apply to windbreaks.

Pres. Elliott: That is the correct theory

FRUITS IN NORTH DAKOTA.

BY PROF. C. B. WALDRON, AGRICULTURAL COLLEGE, FARGO, N. D.

If North Dakota were to be known by her fruits alone (using the term in a strictly pomological sense) she might not excite the admiration that she now does, and yet she would not be wholly without honor.

Her native fruits that have promise of considerable value are six or eight in number, while the entire number will exceed a dozen.

As in most localities, the rose family heads the list, with one plum of two or three marked varieties, one strawberry, two raspberries, one Juneberry, two thorn apples, three cherries and several roses. Aside from these, the other orders give us the gooseberry, currant, buffalo berry, high bush cranberry, grape and the acorn and hazelnut.

The hazelnut found in North Dakota is the *Corylus Americana*, though probably the *Corylus rostrata* is also a native.

The *Quercus bicolor* and the *Quercus macrocarpa*—variety *depressa mania*

—these and the hazelnut are found along all the rivers and in the region of Devils Lake and the Turtle Mountains.

The gooseberry, *Ribes oxyacanthoides*, and the currant, *Ribes prostratum*, are not very abundant and hence not very important. The gooseberry is very fruitful, and could perhaps be grown to advantage in certain localities; it is gathered by the bushel. The currant is nearly valueless.

Of the thorn apple, I found only the *Crataegus coccinea*, though from descriptions that I received I think that the variety *mollis* of this species is to be found in the eastern part of the state. The fruit is very free from insect pests, and is highly esteemed by many as a dessert fruit. The fruit of the variety *mollis* is an inch in diameter.

The roses that grow the most abundant and fruitful are the *Rosa blanda* and the *Rosa Engelmanni*. The latter has a large fruit about two and one-half times long as broad, is rather juicy and of a flavor much like the thorn apple. The rose hips of both species are eaten readily by the prairie chicken, grouse, antelope and rabbit, the Indian also comes in for his share. I have seen this fruit in such quantities over large areas that it would have furnished food for hundreds of sheep.

The juneberry, *Amerlanchier alnifolia*, is probably well known to all that are present. So far south as this, it has a straggling habit, and is such a shy bearer as to attract but little attention. In the northern part of Dakota, especially in the Turtle Mountains, it is small and bushy, and produces fruit in such quantities as to be of considerable importance. Its chief value is as a dessert fruit. Cooking makes it taste like the cherry.

The cherries of the state are represented by the *Prunus pumila*, *Prunus Virginia* and *Prunus demissa*.

The first, *Prunus pumila*, or sand cherry, does not vary much from the same fruit found further south and east. The fruit is large and tart, and has about the same use that the tame cherry would have, except that it is used largely in making jellies. Its greatest value by far is its use as a stock on which to graft the tame sorts. From experiment already made, it promises to stand very high in this respect.

The *Prunus Virginia*, or choke-cherry, dwarfs rapidly as we approach the north, at the same time becoming much more fruitful. The fruit changes greatly in quality toward the north, being larger, juicier, and less astringent, so as to closely resemble the *Prunus demissa* with which it is associated. The *Prunus dessima* fruits very abundantly, when fully ripe it is but slightly astringent and is really a valuable fruit. Its height in the northern part of the state corresponds with the choke-cherry, being about six feet.

The plum, *Prunus Americana*, is represented by two well marked sorts, one being large and yellowish and the other small and red. The first is by far the most valuable, being sweeter and having a less acerb skin. The quality of the fruit does not differ from the same species found in other states. It is used for making marmalades and jellies, but for stewing and cooking it is nearly valueless. It is valuable as a dessert fruit in some localities, especially the yellow variety.

The high bush cranberry, or *Viburnum opulus*, grows very abundantly in some localities. The fruit is of no better quality than when found further south. It is used extensively by some people, but with the unin-

itiated its quality is very forbidding and its bitter, unpleasant taste long to be remembered. It is used chiefly by the frontier hotel in making pie.

The wild grape, or *Vitis riparia*, grows abundantly along all the streams, and seems to fruit alternate years. The fruit from individual plants varies greatly. It is used in making wines and jellies.

The strawberry, *Fragaria Virginiana* and *Fragaria Virginiana Illinoensis*, grows in all parts of the state where the prairie is broken, along the edges of the ravines, along thickets, and in the so-called timber country. Its productiveness varies greatly in different years, and, while fairly abundant, it is not found in such quantities as to make it valuable as a market berry. The readiness with which it grows would indicate that the hardy cultivated varieties could be grown with success in nearly all localities.

The common red raspberry, *Rubus strigosus*, is found everywhere east of the Missouri. It grows in all places except in the open prairies. It is no less delicious and fruitful in North Dakota than I have found it in the most favored localities elsewhere. It finds its way freely into the markets of the western towns and a citizen who does not go raspberrying two or three times a year does not live up to his luscious privileges.

The black raspberry, *Rubus occidentalis*, is more restricted as to locality. It was reported from but one place, that being in Richland Co., though there is no apparent reason why its range could not be greatly extended.

Perhaps the fruit that is of the greatest value is the *Shepherdia argentea*, commonly known as the buffalo berry or bull berry. It grows everywhere, along streams, and so far back as timber of any kind is found. It grows readily in yards, and would probably endure cultivation almost anywhere in the state. As we approach the northern part of the state, it becomes lower in habit, bushier, and we find the same increase in fruitfulness that accompanies all dwarfing. The fruit is borne in irregular clusters at the side of the stem, and in such quantities as to give it a strikingly red appearance. The foliage is of a bright silvery color, the oblong leaves being covered with brownish scales. The fruit is very juicy and, when first tasted, has a pleasant acid flavor, but, if retained in the mouth, it imparts a sensation of sweetness. The uses of the fruit correspond very nearly with that of the cultivated currant. It is not inferior to this last named fruit in the making of jellies or any of that class of condiments.

There are many features of the North Dakota soil and climate that would seem to foretell success in the production of many kinds of fruit. The soil is easily cared for and very retentive of moisture. The dwarfing that the high latitude causes insures a large production of fruit, in case the plants can be grown at all. Mildew and rust are seldom seen, while the insect enemies are not yet instructed as to the large fruitful area that lies open to them.

The actual amount of wild fruit consumed is almost great enough to excite the wonder of one used to depending almost entirely upon cultivated fruits, and although the fruit capacity of the state can and must be much enlarged, yet the van of North Dakota settlers enjoys many of the pomological blessings of nature without leaving a train of tin fruit cans in its rear.

DISCUSSION.

Geo. J. Kellogg: What has been done in the cultivation of the strawberry? Has it been a success?

Prof. Waldron: Yes, sir; it has been a success. One man has grown them for years. I do not know in what quantity they are grown, but they send to Minneapolis for their strawberries.

C. L. Smith: Currants do just as well at Fargo as at Minneapolis; in fact, if there is any difference it is rather in favor of the Red River valley than of Minneapolis. Strawberries as a rule do not do so well. The difficulty has been the new soil is too light and too loose, and they are severely affected by those hot winds that come in July. At one place where they used slough hay to mulch the plants as soon as they were set out in the spring they did better than by any other process that had been tried. Set plants in the spring and mulch heavily as soon as set out. At Jamestown and Steele and one or two other places out there they have been quite successful.

Dr. Frisselle: I have a little acquaintance in the Red River valley. I have a daughter living there. Last year I was there in August. She was just then getting a few red raspberries from her bushes after the middle of August, and the currants in her garden did well; she had plenty of them; but the trouble there is that in the spring of the year there is a strong wind that blows and blows and does great injury to all young plants and absorbs the moisture, and they cannot do well unless mulched.

FRUIT GROWING IN LINCOLN COUNTY.

By W. J. WICKERSHEIM, Idlewild, Minn.

My father's orchard consists of about 75 trees of Duchess, Wealthy, Tetofsky, Early Strawberry, Prices, Winter Sweet Beachs Sweet, Meaders Winter and a few other crabs and a variety of winter hybrids.

The orchard is situated in the central part of the county on a high rolling prairie. The site slopes toward the north and west. It is protected on the south side by a young grove of cottonwood, ash, box elder, choke cherry and wild plum, and on the remaining sides, with the exception of a narrow opening on the southeast, there is a hedge of cottonwoods and white and gray willows. The soil is a black sandy loam 20 to 36 inches deep over a clay subsoil.

The trees were planted nine years ago, two dozen being from four to five feet tall and the remaining one year old transplanted trees.

Crops of corn, beans, tomatoes, cabbages, raspberries, gooseberries, currants and strawberries are grown in the orchard every year.

In addition to these apple trees there are nine in front of the farm buildings on a southern slope. Last spring 28 were loaded with blossoms, and about a dozen more had some blossoms. The heavy frost during the latter part of May destroyed much of the fruit; the fruit on a dozen trees being entirely destroyed. Yet the few young trees that remained bore 17 bushels of ripe crabs and apples. If it had not been for the late frost, the yield would have been three times as large.

The extremes of temperature during the year were -30° Farenheit, and $+105^{\circ}$ Farenheit.

Although those trees in front of the house were well loaded with fruit during the early part of June, the hot, plutocratic, southwest winds exacted for tribute all of the Duchess, most of the crabs and a good share of the Wealthy before they had ripened. Of the nine trees two are Duchess, four Wealthy, two Prices, and one Beachs Sweet. About all the apples that remained on the trees until ripe were on one Wealthy and the Beachs Sweet—about $\frac{1}{2}$ bushel each.

Those protected in the orchard, at the back of the house, received far less injury from the hot, southwest blasts. If they had been well protected on all sides the yield would have been considerably larger—probably 40 bushels instead of 17. In southwestern Minnesota and South Dakota, an orchard without protection from the hot south and southwest winds is worthless. A southwest blast will create as great a havoc in an unprotected orchard as a cyclone. The temperature of these blasts is from $+80^{\circ}$ Farenheit to $+98^{\circ}$ Farenheit.

The best trees yielded as follows: 1 Early Strawberry, 2 $\frac{1}{2}$ bushels; 3 Meaders Winter, 4 bushels; 2 Prices Sweet, 4 bushels; 2 Duchess, 1 $\frac{1}{2}$ bushels; 1 Transcendent, $\frac{1}{2}$ bushel.

The trees that seem best adapted to Lincoln Co., and consequently for southwestern Minnesota and South Dakota, are the Duchess, and among crabs, I would name first, Meaders Winter and Early Strawberry, and second, Prices and Beachs Sweet. The Tetofsky is worthless. Although the Wealthy is hardy and healthy, it is a slow grower and a very light bearer. Where the Wealthy yields one bushel, the Duchess, under similar conditions, will yield five bushels.

Before leaving home in September to teach, I planted seed of the Duchess, Early Strawberry and a few others. The trees in my prospective orchard will be chiefly from these seeds. I have a strong faith in the apple and firmly believe that apples and crabs and small fruits can be successfully grown in southwestern Minnesota and South Dakota.

The past three years the strawberry yield has been light on account of the drouths. The cultivated and native gooseberries, and of raspberries, the Turner, yielded heavily in '88 and '90. Last spring I planted 30 blackberries of which all but a few grew nicely and vigorously. We have 20 mulberry trees—red, and a few white—from 5 to 11 feet high, which were well loaded with fruit the past two years, during which time but from two to five buds of the ends of the branches have "winter killed."

So comparatively few farmers take any interest in tree culture and fruit growing in southwestern Minnesota as to give it a bad repute. The majority of them appear to think that a farmer should confine himself to growing wheat, oats, flax, potatoes, some corn, and to raising stock. These "grad grind" farmers are not aware that they are depriving themselves

and their families of one of the most pleasant, beautiful, and profitable features of farming. We must educate the farmer to love the true, the good, and the beautiful—to love nature—before he will grow fruits, and protect his crops with belts of forest trees, and beautify his home by surrounding it with all kinds of hardy forest and ornamental trees, and shrubs and flowers.

I have learned by experience that small fruits can be grown with very little trouble, and therefore every farmer ought to have his table well supplied with these delicacies.

DISCUSSION.

Col. Stevens: I would like to inquire if this farm is not on what is called the Coteau de Bois, hilly woods?

Judge Moyer: It is all prairie. It is right on the Coteau.

President Elliott: It is about 1,700 feet above sea level.

Col. Stevens: Now just on top of the hills out there they can raise apples better than on the prairies.

REPORT OF GENERAL FRUIT COMMITTEE.

BY CLARENCE WEDGE, ALBERT LEA.

Freeborn county this year rejoices in the largest crop of apples ever harvested within her borders. Indeed, for a new thing under the sun, we had a surplus, and some thousands of bushels of summer apples were actually shipped out of Albert Lea. Many orchards have furnished their owners with an abundance of summer fruit and enough for sale to purchase a winter supply.

The Duchess and Transcendent furnished the bulk of this fruit, but some of the hybrids that have been planted so generally, helped to supply the home market. No variety of standard apple has appeared upon the market besides the Duchess, and I am safe in saying that no tree of the apple kind is proving so generally hardy, productive and profitable. The best orchard in our county, a half acre planted exclusively to this variety twenty-two years ago, has stood in blue grass sod without any care or attention whatever, and has yielded the owner an annual income of from \$100 to \$150. The Wealthy has been planted extensively for many years, but I have yet to find a healthy tree of any great age. Still, I think it may be well to plant this variety sparingly for home use. It has fruited heavily this year, and appears to keep much better than usual. The Whitney I am almost inclined to class with the standard apples, and place it next to the Duchess. In size it will rank as a small apple, but its quality, both for kitchen and dessert, is excellent, and the tree is doing well wherever I have found it. The oldest I have seen measured two feet in circumference of trunk.

Of the crabs and hybrids the Early Strawberry, Orange, and an endless variety of Blushes and Sweets have been largely planted, and on the farm

are the delight of the small boy's heart, but on the market they are not appreciated, and their small size should limit their planting to the family fruit garden, unless some of the winter varieties shall prove hardy enough to fill the demand for a winter crab.

The Russian apples have had but a short trial with me, and no trial at all in this vicinity that I can learn of, outside my own orchard. Trees procured from Prof. Budd and A. G. Tuttle, planted from three to five years ago, fruited generally this season, but a severe hailstorm occurring when the fruit had set, and another when it had begun to turn, destroyed my hopes of giving the fruit a fair test.

I notice that Mr. J. S. Harris, in his description of the Hibernal, in our last report, has put it down as a tardy bearer. It has not so proved with me. Trees set three years ago were well loaded this season, and now have well developed fruit buds for another crop. The apples have a peculiar crab-like flavor that unfits them for dessert, but for cooking purposes they are excellent. The tree has not shown blight or been injured by cold, and its sturdy growth, extra early and heavy bearing, large size and beauty of fruit, its keeping and cooking qualities, have greatly pleased me. Vereilles Reinette (282) of Budd, five years planted, bore a fair crop for first time, and has not been injured by cold or blight; fruit a good sized handsome apple that may keep better than Wealthy. Vargul and Long Arcad, three years planted, are perfect in tree, and set a little fruit for the hail-storm to destroy. Czar's Thorn and Barloff nearly ripened a few very beautiful apples. Trees not quite perfect. Charlanuff, five years planted, bore well and is a perfect tree; fruit better than Duchess, hangs better to tree, and ripens a little later. I am much pleased with it. The Long-field, Repka Malenka, White Transparent, Blue Anis, Nos. 284, 252 and 984 are not hardy.

Of pears, Kurskaya (392) five years planted, about twelve feet high, is looking finely, and gives promise of fruit next season. I have also the Chinese sand pear and the Bessemianka, both too young to deserve attention.

No fruit planted at my place has given better satisfaction than the De Soto plum. Their season is later than the wild plum, and their years of heavy bearing do not appear to correspond to the "plum years" of the wild varieties, which serves to make them profitable for market and very acceptable for the home garden. The Forest Garden is not so good a bearer and the fruit is softer, but being earlier than De Soto, is good to plant with it. The Weaver was quite generally planted in our county about eight years ago, but I have yet to find a place where it has given satisfaction.

Grapes are steadily gaining ground with our planters. Concord has again failed to ripen up sweet and fine, and I still think Warden and Moores Early better varieties for general planting. Cottage, Lindley, Agawam, and Lady are among my favorites.

The Orthiem cherry, five years planted, has thus far been perfectly healthy, and this year for the first time furnished the birds a few cherries.

For the past three years I have given red raspberries, black caps and blackberries thorough cultivation instead of mulch, and have had perfect failures, canes make strong growth, set wonderfully with fruit, that dried up when half grown. I have manured the ground liberally, cultivated faith-

fully, trimmed, pinched, covered, tied to wires; all for a wilderness of bloom and a few quarts of inferior fruit. If such experience is good for anything I hope it will be made use of, it is certainly costly enough.

In the southeastern part of our county, on the farm of Mr. Budlery, I have found some fine specimens of the Douglas spruce of Colorado. They have been planted fourteen years and are bearing cones. They are not such rapid growers as the Norway spruce, but their beautiful, fresh green appearance presents a strange contrast to the dull, faded color of the Norways in the same yard. Mr. Budlery assured me that they always preserved the same good color even when the common evergreens were badly burned. In the same collection were some cedars from the Rocky Mountains, that were very ornamental. They resemble the red cedar, but have no spines; their berries are round, and I think the trees are of a brighter color.

I find the laurel leaved willow quite ornamental, and the young growth very tough and excellent in tieing corn fodder, grape vines, etc.

The dry seasons of '88 and '89 killed or seriously injured a large share of the old established shade trees in the city of Albert Lea. The hard and soft maple, box elders, butternuts and cut-leaved birch fared the worst, while I have not found an elm or ash injured in the least. The soil of the city is a sandy loam on a sand and gravel subsoil. In planting on such soils I would avoid the above five varieties and plant largely of the latter two. Nothing is more disheartening than to plant a tree in hope, care for it with pride, have it grow in your affections for half a lifetime, and then have it wither and die over the very home it had grown to protect. There is nothing merry in the sound of the axe as it strikes at the dead roots of our favorites. The cherished apple trees upon the wood pile, and the family tree lying at full length across the lawn, are sights that bring weariness to the heart of the true horticulturist.

Let us hope that the hard experience of the past, the bitter disappointments, the hopes deferred, may prove but the solid stepping stones to an era of prosperity for our art which shall be a blessing to our children's children in this our chosen Northland.

FRUIT REPORT.

BY M. C. BUNNELL, NEWPORT, MINN.

Mr. President and Members of the Minnesota State Horticultural Society:

I find that the interest in horticulture in Washington and Dakota counties is still being kept up, and that the year 1890 has been quite favorable to the fruit grower towards bringing him in a remuneration for the labor and money expended.

For instance, the Duchess, the leading standard variety as regards hardiness of tree, has fruited so well in many locations that farmers say they must have some more Duchess. If we could only get a late variety that would stand like the Duchess and of good quality, Minnesota in a short time would produce apples enough for home consumption.

The Wealthy is very well liked, especially for its productiveness and

quality. Its flavor and keeping qualities surpass the Duchess; no better for cooking, but a pleasanter apple to eat out of hand, though not as hardy a tree. Some like a few Tetofskys on account of earliness and quality of fruit. It is not as good a bearer as the Duchess and not as profitable a tree to the orchardist. The Whitneys No. 20 is coming into favor more every year, as planters find what the hardiness of the tree is, beauty of the growth and quality of fruit. The last year I noticed the blight amongst the trees, at the same time the fruit seemed to be of full size. The Transcendent seems to take the lead among the market gardeners as the best crab for all purposes. And I think more of these trees are bought than any other crab, notwithstanding the ravages of blight they are subject to. They do not buy as largely of Hyslop, but the prices in St. Paul market range from \$1.50 to \$2.00 per bushel. The Early Strawberry crab and Orange crab do well. I find in my travels Orange crab trees 4 to 5 inches in diameter fruiting well, also Minnesotas. A Mr. Frost, of Tower Grove township, Dakota county, reports to me that he picked ten bushels from five trees, also gathered 50 bushels of Duchess, which he sold in St. Paul market at an average price of \$1.35 per bushel. The Transcendent he sold from \$1.00 to \$1.25 per bushel. He raised two thousand pounds Concord grapes at an average price of four cents, and sold forty bushels of currants at \$1.75 per bushel.

Mr. Bole, of the town of Woodbury, Washington Co., showed me Duchess trees that he planted twenty-three years ago. They apparently looked healthy and are productive. The plums that are principally planted are De Soto, Weaver, and the Forest Garden for the early plum. What fruit there was brought a good price, though the blossom buds were injured by spring frosts. A few pay attention to raising grapes, and where they do they make a success. The grapes shipped from below keep the price down. Currants and raspberries were a paying crop. The currants planted principally are Red Dutch, some Cherry, Victoria and a sprinkling of white and black. Raspberries planted are Turner and Cuthbert for red, Mammoth Cluster, Gregg and Shaffer's Colossal for black. More attention is being paid to the planting of blackberries. I would recommend Stone's Hardy and Ancient Briton with winter protection. Strawberries were almost a failure though considerable better than in the year 1889. The gardeners still stick to the old reliable Wilson for shipping. For productiveness on all kinds of soil the Crescent excels it. I haven't had much chance to see what the Jessie would do, but I think where they are well cared for they make runners fast, and the fruit grows large. As to the Bubach and Warfield No. 2, I don't find many of them plentiful where I travel. In fact the berry growers around this city I don't think have tried them much.

A limited amount of gooseberries are planted, Houghton and Downing. But little is known about the Industry. Some of the farmers are paying attention to planting of evergreens, which is a wise plan. It is one of the best protections a farmer can have to shield him from the severe storms. The Norway spruce is my favorite tree. White spruce, Scotch and white pine are good. I find it difficult to make evergreens do well in the city, owing, perhaps, to the gas and smoke which arise.

Now for planting an orchard I would select a high location north.

slope, and if I could get it, a clay soil. Plant a tree from two to three years old and two to three inches deeper than when taken up. Mulch thoroughly after planting and protect the trees from stock. In locations where the orchard is exposed to the sun I would have my trees headed low. Some recommend leaning them a little to the southwest when they are planted. I can see no reason why, if trees and small fruits are properly planted and properly cared for, the grower cannot be well paid for his expense and trouble, and enjoy these luxuries of which many deprive themselves by not giving the necessary attention they should to horticulture in Minnesota.

REPORT OF M. PEARCE, CHAIRMAN OF THE GENERAL FRUIT COMMITTEE.

To the Officers and Members of the S. H. S. of Minnesota:

Early in the spring I received a notice from Secretary Green, stating I had been appointed chairman of the General Fruit Committee. As my name as such did not appear in our report I supposed it was a mistake and gave it no thought. Late in the fall I received another notice from the secretary requesting me as chairman to look after the fruit reports for our winter meeting. I wrote about two hundred letters to the members of the fruit commission and other parties over the state, requesting a report on the various kinds of fruit from all. I received numerous letters and some reports, the most of them were of but little interest to the society. From the contents of the letters received it is very apparent that there are large portions of the state where there is but little or no fruit grown, especially in the western part of the state. The great fruit belt at present is west of the Mississippi river, extending about 150 miles west. From this belt the apple reports are very satisfactory. The crop was unusually good. Some parties grew over 1,000 bushels of the best of apples, which they disposed of in many instances at \$2.00 per bushel. Apple growing in Minnesota has taken a big boom.

The grape crop, as far as I can learn, was good. From reports around Lake Minnetonka, not less than 150,000 lbs were grown last season.

The strawberry crop was nearly a failure last season, owing to excessive wet during the time they were in bloom. The raspberry crop was injured some by drought. About 75 per cent. of a full crop was harvested. Blackberries were also injured about 50 per cent. by drouth. Currants very good.

REPORT OF J. C. KRAMER OF GENERAL FRUIT COMMITTEE FOR HOUSTON COUNTY.

Mr. President and Members of Minnesota State Horticultural Society:

My brothers, I herewith send you my feeble report hoping that the society will accept it. I do not have a good report for last year (1890).

The strawberry plants came through the previous winter all right, but

in May we had a hard frost that killed all the blossoms and the fruit that was set, and nearly destroyed the whole crop.

Raspberries were a little better and in some places very good, especially the black caps. The Ohio did the best.

Blackberries were generally a very good crop. I have a white blackberry that is hardy, and is so thorny that women and girls cannot pick them.

Apples with me were a poor crop except the Tetofsky. The Duchess bore pretty well but they were not worth picking; all the apples were ill-shaped and knotty with hard spots in them. In some parts of this county the apple crop was large and good, and a great many Duchess apples were shipped to market. I have some Seedlings that I think of great value. One of them is a seedling of the Transcendent. It is a sweet, winter apple, color white and yellow with red cheeks; good to eat and cook. The seedlings received from the experiment station at Excelsior are doing well.

Seedling strawberries did not bear well last year but they look very promising for next summer. I would like to say to the members that the Princess strawberry plants are doing excellently and I am able to supply all who want them with good, healthy, strong plants.

I should like to be with you but I do my own work daily and find that I am growing old (am 73 years); but I cannot sit still, it would be harder than work. If you have any other burdens you wish me to bear I will try to do your will, and will keep on the watch for your interests. Please keep my name on the roll of members.

Yours truly,

J. C. KRAMER.

REPORT ON FRUITS.

BY SIDNEY CORP., HAMMOND.

Last season was a total failure for strawberries in this section, caused by late frost in the spring, and red raspberries were a short crop. Black caps and other small fruit were good. Apple blossoms were killed on low ground, and there was a light crop generally. There were some places on high ground where the crop was good. My small orchard enabled me to supply the local demand and ship seventy-two barrels to other markets. My standard apples were Duchess of Oldenburg, Wealthy, McMahon, White and Yellow Annis, and of hybrids, Beechers Sweet, Hyslop, Meaders Winter and Whitneys No. 20. There was more blight this year on the apple trees than ever before, and I look for a light crop of fruit next year on account of so much of the young wood being killed by the blight.

VICE PRESIDENT'S REPORT.

M. PEARCE, CHOWEN, MINN.

The first part of the season was unusually wet, and more than three-fourths of the strawberry blossoms were destroyed. The raspberries and blackberries were also injured by the wet, and again by the drought which followed, so that only 75 per cent. of a good crop was obtained. There was a full crop of currants and grapes. The apple and crab crops

were very good. The Duchess and Wealthy are doing well, and will be largely planted during the coming season.

Of Russians, Charlamoff, Autumn Streak and Hibernal are doing extra well. Other varieties of Russians are sent out under the names of those mentioned. This is misleading to the grower.

Ancient Briton and Snyder blackberries are considered the best in this locality. Windom dewberry and Lucretia are not up to expectations. Hansel, Cuthbert, Marlborough and Turner are the best red raspberries. Souhegan and Gregg are the best black raspberries.

We are fruiting the following strawberries; those mentioned first we consider the best: Warfield, Crescent, Bubach No. 5, Wilson, Jessie and Windsor Chief. The following are grown more especially for fertilizers: Pioneer and Glendale. We set last season for trial the following: Haverland, Cloud, Michaels Early, Daisy, Lady Rust, Crawford and Gandy.

In experimental work we are making progress in apples and hybrids. In our last report we stated that (No. 1) Tonky (hybrid) was very promising. Beyond any doubt this variety will stand as far north as any known variety. A beautiful grower, the fruit handsome and good.

Nos. 2 and 3 apples, Victor and Unknown, are both more hardy than the Duchess—free from blight. Fruit of excellent quality, both for eating and cooking. Those varieties are all fair keepers. We are propagating them largely. In addition to those we can say we have a new Minnesota, strictly winter apple of the best quality. A cut and description of this apple was taken by J. S. Harris at our state fair, where the fruit for the first time was on exhibition. We are much pleased with a new hybrid which we call Arctic. The tree is 14 years old. It has never blighted, neither have any of the trees propagated from this variety. So far the trees have been perfectly hardy, annual bearers, and the most prolific of any variety we have ever known. Fruit larger and better than the Transcendent.

The following grapes take the lead: Concord, Worden, Delaware and Moores Early. The latter for early.

REPORT ON NATIVE PLUMS.

J. S. HARRIS, LA CRESCENT.

It is encouraging to note that there is a growing interest in our native plums of the family *Prunus Americana*; that plum literature is eagerly sought for, together with a manifest disposition to hunt up and test the varieties that have a local reputation. I repeat what I have said many times before, viz: There is no wild fruit of this age that presents so promising a field for experiment as our own native plum. I have now made it a study for a number of years and am falling into the belief that in some past age it has been cultivated by man but has deteriorated or gone back to the wild state, corresponding to the barbarians who inhabited this continent just before us, and that it remains for us to restore it to its primitive conditions and enjoy a fruit in every particular equal to the peach, apricot or nectarine. The last season was not favorable for prosecuting investigations owing to the severe freezing in May after the trees had bloomed and set their fruit. A few more varieties have come to

my notice which I will report as an addition to the list presented at the last annual meeting and published on pages 125-28 of report for 1890.

1. Wood's plum: size, large; form, round oblique; diameter, 1 $\frac{1}{2}$, (said to be larger in favorable seasons); color, deep brownish red; flesh, yellow; flavor, peachy, good; season, Aug. 20th to 30th; a clingstone; originated from seed by Joseph Wood, Windom, Cottonwood County, Minn.

2. Seedling: medium large; form, round oval; color, pale red; flesh, yellow, rather soft; flavor, good; skin, thick; pit rather large. The fruit may have been affected by drouth. It is a plum of very fine appearance, originated from seed by Mr. Lilly, of New Ulm, Minn.

3. Cotterell plum: large; oval; deep red, blotted purple and covered with light bluish bloom; flesh, medium meaty; flavor, sweet and rich; nearly freestone; origin, Dover, Olmsted Co., Minn; tree a strong grower.

4. Harrisons Peach: large; round oval; ground color, yellow covered with light and dark red; flesh, deep orange, juicy, good; tree good but too shy a bearer; originated at Minneapolis, Minn.

5. Ocheeda plum: large round; yellow blotched with deep red on sun side; flesh, orange yellow, meaty, sweet, apricot flavor; pit, small, oval, thick, nearly freestone; tree, vigorous and stocky; leaf, large; origin, Nobles Co., Minn.

6. Woolf plum: size, large; form, round; color, deep red finely dotted with gray specks, covered with white bloom; flesh, firm, greenish yellow; flavor, good; freestone. This variety is fruiting with O. M. Lord, Andrew Peterson and Dewain Cook, and is promising. It originated in eastern Iowa.

7. Quaker plum: size, large; form, round; color, brownish red, thickly covered with gray dots and over all a bluish bloom; flesh, deep orange, juicy, good; tree hardy, upright grower with Mr. Sias; origin, eastern Iowa.

8. F. A. Neil, Hamilton, Minn., showed at the S. M. fair a fine looking plum: size, large; form, round; color, yellow with splashes of carmine or pink; pulp, greenish yellow, meaty, good flavor. He reports the tree of a spreading habit, hardy and productive; diameter of fruit, 1 $\frac{1}{2}$ to 1 $\frac{1}{4}$ inches.

9. Leonard plums from Washington, Fillmore Co.: two seedlings from wild native do not differ very materially; size, medium; form, round oval; color, purplish red, blue bloom; flesh, deep orange; flavor, good; said to be immensely productive.

We have now got track of so many good varieties of native plums that we would call the attention of this society to the importance of having at least the best of them catalogued for future reference and recommend that a committee be appointed with that end in view, and instructed to report at the annual meeting of 1892. All of which is respectfully submitted.

REPORT OF THE SEEDLING FRUIT COMMISSION.

BY J. S. HARRIS, LA CRESCENT.

Mr. President and Members of the Minnesota State Horticultural Society:

I do fully realize the arduous work that is required of this commission and the importance of having the work done carefully and well, and I

have the honor to report to you that I have performed it conscientiously and as thoroughly as circumstances would permit. I started out on August 22 and spent three days in Fillmore county. We found here the largest and best crop of apples that has been raised since 1884. The orchards are composed too largely of crabs and hybrids to be profitable to their owners in a commercial point of view; but we should estimate from what we saw that the whole apple crop of the county would represent a value of thirty thousand dollars. At August Krigel's, near Forestville, we found an orchard containing several seedlings grown from seeds taken from the Duchess apple. I should estimate their age to be about 15 years. Five of them produce fruit of fair size and in season somewhat later than the Duchess. None of them were in eating condition when seen. The trees appear to be healthy except that one of them has received injury from sun scald, which is not surprising, as the trunks of all of them have been pruned up to five feet and some of them lean toward the northeast. The five varieties are said to cover the season from September to past mid-winter. In their vicinity and over the higher lands of this county the Duchess, Tetofsky, Whitneys No. 20, Orange and Minnesota are a success, and the Wealthy, Haas, Fameuse and some other varieties have so far recovered from injuries that they are bearing considerable fruit this year. At Carmonia a few of the once famous Picket's Seedlings yet remain. They have become large trees producing heavy crops, but most of them are subject to blight and their size and quality do not recommend them for commercial orchards.

At Etna, D. K. Michenor has one of the most profitable orchards in this state. The paying part of the orchard is planted to Duchess and Wealthy. He is engaged, to some extent, in raising seedlings from selected northern seed and has three in bearing that produce excellent late autumn fruit. After the close of the state fair, Sept. 15, I visited the orchard of J. G. Miller, Richland township, Rice county, for the purpose of examining the original Peerless apple tree. The tree was laden with fruit at that date. It stands nearly erect, but leaning slightly toward the northeast. It has a clean trunk of about 4 $\frac{1}{2}$ feet that supports a round, compact head, almost perfect in form. Some fruit had been picked for showing at the state fair, but I should estimate what remained upon the tree at about three barrels. I found the tree in really good condition, which is remarkable when we take into account that for the last three years it has been closely cut for scions. In that time it has been multiplied into over fifteen thousand trees, and a plenty of good scions could be cut this year. The tree is now twenty-three years of age. Mr. Miller states that it originated from Duchess of Oldenburg seed. The fruit is of medium size and handsome in appearance, and in quality equal to the Wealthy. Its real season is mid-winter, but probably with careful handling may be kept later. Another seedling produced from the same source, of same age, is Miller's Jeniton. The tree is larger than the Peerless, a strong grower, and apparently hardy. The fruit is smaller, of fair quality, and is in season through October. The trees are free from blight, and productive. The George Miller tree, the same age is one of the best autumn apples I have ever met with, but the tree is subject to blight, and is a shy bearer. Mr. Miller has a considerable number of younger seedlings from select seeds, of the hardiest variety, and will probably be heard from again in the near future. At Medford, Rice county, Mr. Wolford has origi-

nated several varieties of grapes from seed. Some of the varieties are as good as numbers that are found in the catalogues. One variety that he has, named Medford Prolific, and believed to be a cross between the Delaware and Northern Muscatine, he claims is two weeks earlier than the Concord and fully as hardy. The berry hangs to the stem much longer than the Muscatine; it is a sweet grape with foxy flavor, and may prove very valuable for localities where the Concord will not ripen. Mr. W. has some seedlings from Siberians that are good and prolific. Sept. 18th we spent at Smith's mill, in Blue Earth county. Here we find more seedlings. Alexander Douglass has some half a dozen trees. One variety is about of the size and season of the Duchess. Another variety is of medium size, a smooth apple in appearance, some like the Peerless, but not so highly colored. It has the appearance of being a good keeper. Another variety is much like a Siberian; the fruit would average 2½ inches in diameter, and the tree, as I saw it, loaded to its fullest capacity with highly colored fruit, was a beautiful sight. It is excellent for cooking and keeps well into January, perhaps longer. Three other varieties are equally as productive and beautiful, but the fruit is smaller.

In this vicinity cranberries grow to great perfection, and it would seem to me that some attention ought to be given to their cultivation. Our next objective point was Worthington, Nobles county. The Okobena tree we pronounce all right. The Daisy has a "patch of sun scald on the southwest side. The young wood of three or four years' growth is not discolored. Should these two varieties survive our next test winter, I shall believe that we have got something good in them. Mr. Ludlow is experimenting with the Russian Mulberry, as a hedge plant. He showed us a row that had been cut back to three feet high, and is kept in a trim and artistic shape by clipping the ends of the shoots twice during the summer. It makes a pleasing and very efficient line or garden fence. From Worthington, Sept. 25, we go to Windom. The county fair is in progress at this place. The display of fruit is fine, but limited in varieties—Duchess, Wealthy, Transcendent, Hyslop, Orange, Minnesota, and two or three other varieties of crabs, and a collection of native plums.

The Wealthy apple is reported as doing even better than the Duchess, here. The greatest losses to trees, of late years, has occurred from root killing. After night we drove out to Dewain Cook's place, 14 miles from Windom. Mr. Cook is engaged in experimental horticulture more extensively than any other man in western Minnesota. He has planted on his grounds almost every variety of apple and crab that has gained any notoriety for hardiness or other meritorious qualities, and including a great number of the newer Russians, and is keeping them labeled and recorded, so that if any of them show merit, he knows the variety, and where it came from. He has a fine collection of native plums and some Russian seedlings that are thriving and brought some extra fine fruit this year. He has also some cherry trees, and five varieties of Russian pear that are looking well. He is showing true heroism on the fruit question. He began the work and has continued it thus far under very discouraging circumstances, but he is bound to succeed, and we trust that his name will yet be enrolled among Minnesota's greatest benefactors.

We spent about five days in our researches in Cottonwood county and saw much that was interesting. It was reported a few years since that

some of the Memnonites had bearing orchards of trees from seeds brought over from Russia; with the apples we have not been able to get any such. We found many fine looking cherry trees, a few plums and pears. The pears, of which some trees are sixteen feet high, appear to be of a wild sort, are undoubtedly hardy, but unfortunately are not blight proof. The fruit we saw, was small, and only valuable for cooking. This people are great lovers of fruit and take good care of their fruit and forest trees, and whenever they can get adapted varieties, will succeed with them.

At Joseph Wood's place, six miles from Windom, are some seedling plums that promise well, and seedling gooseberries free from mildew, and that he describes as bearing fruit of very large size. His large fruited Russian mulberry is proving more tender than the common varieties. He reports the Dwarf Juneberry as doing well and producing fruit of superior quality. Our next visit is made with C. G. Patten, Charles City, Iowa.

Mr. Patten is a director of an experimental station for the Iowa State Horticultural Society, and is making a specialty of testing the newer Russians and northwestern seedlings, and is also engaged in originating varieties from selected seed. We saw at his place eight varieties grown from seed of Duchess, all possessing some merit. His Duchess No. 3 (also called Patten's Greening) is the best of all. The original tree is twenty-one years old, so that it has survived through two of the most trying winters that have ever visited the Northwest. The tree is nearly perfect; it stands in a row with seven Duchess of the same age and looks better than any one of them. As a nursery tree it is unsurpassed. It is an early and free bearer. The fruit in size is from medium to large, the form is flat round; the color greenish yellow, with dull to deep blush on the sun side. The flavor is a good acid, extra for cooking. The season is November and December; with careful handling it may be kept until February. There is another variety of the lot that produces a fruit of medium size, and of superior quality for eating, we have lost the number. The season is November. We took a great fancy to a tree of the Iowa Beauty. The tree is a vigorous, healthy, symmetrical grower; fruit, medium size, beautifully striped with red and covered with whitish bloom; flavor, a mild subacid, good; season, September and October. He has a considerable number of eight year old seedlings crossed between Duchess and some of the longest keeping American varieties, set alternately in rows with the best known Russians, with the view of testing their adaptability and comparative hardness. They have been transplanted twice so as not to give them the advantage over root graft Russians, which are of the same age. Several of the seedlings showed some fruit, while but one of the Russians, the Beautiful Arcade, has borne any.

In Houston county the old tree, Kleine No. 1, is doing well and matures a heavy crop of fruit. The variety has been named after the wife of Mr. Kleine, (Catherine) and will hereafter be known by that name. Several of the seedlings of E. Wilcox, La Crosse, Wis., are doing well as top grafts, worked on crab stocks. The variety exhibited at our last winter meeting, under the name of Wilcox Red Winter, is believed to be Scott's Winter, of Vermont. Steps have been taken to decide the matter, and the result will be announced in proper time. A. J. Phillips, of West Salem, has a seedling tree that promises to be of great value for western Wisconsin.

sin and southeastern Minnesota. Tree, 30 years old; fruit large, form round, conical; color, light green, striped, with pale red; flesh greenish white, solid, fine grained, sub-acid, good. Season, until March. We called upon friend Gideon in November. He reports ten more seedlings as fruiting. Most of the fruit was gone at the time. None of the varieties will keep longer than the Wealthy, and those we saw were not equal to it in other respects. He has a great number yet to fruit, and we may reasonably hope for a long keeper among them.

Andrew Peterson has a variety named Wolff seedling. It seems to be fully more hardy than the Wealthy. The fruit is of medium size, fine appearance and a good keeper.

In our travels we have seen many varieties of the Siberian hybrids that seem to be well worth looking after, for trial in those sections where the apple will not succeed.

In conclusion, we would report that the outlook is hopeful. The interest in fruit culture is growing, and everywhere we find more attention given to planting seeds with the view of originating new and better varieties.

REPORT UPON FRUIT BLOSSOMS FOR THE YEAR 1890.

BY O. M. LORD, MINNESOTA CITY.

The first fruit blossoms appeared upon wild plum seedlings May 1, nearly one month later than the year before. The Cheney is usually the first to show blossoms, and were in full bloom on May 9, while nearly all other northern plums were just beginning to show. The Chicksaws were slightly starting. The Ostheim cherry was in full bloom on the 12th, also currants. The Wilson was the first strawberry to bloom, but only a few were observed on the 12th. Apple trees showed bloom on the 15th, and blackberries and raspberries were full on the 20th. The principal object of the inquiry in regard to date of blossoming is to determine the adaptability of the different fruits to our climatic conditions.

Leaving out the consideration of drouth, the time of maturity after blossoming does not greatly vary, and though there was a month's difference in time of blossoming, the last two years were both fruitful. Observations should be made and records kept for a series of years, to be of practical value.

APPLES.

THE ORCHARD.

BY E. H. S. DART, OF OWATONNA.

(Read before the Steele County Agricultural and Industrial Society.)
Mr. President and Gentlemen:

The best location for the orchard is found to be a high northern slope tipping down to the north or northeast, the more the better, provided it is not so steep as to interfere with cultivation. Why is this best? Because our trees are killed by drouth and on this slope the hot sun and drying winds do not absorb moisture as rapidly as on level land or a southern slope.

The worst location is a low sheltered nook where the cooling breeze is

excluded and the sun has free access. Why? Because it is the hottest place in the day time and the coldest place at night, consequently the greatest and most sudden changes occur.

Many farmers surround their buildings and orchard with a dense wind-break on all sides and they wonder why the orchard does not thrive. Except so far as the ground is partially shaded this is a hard spot for fruit trees, and the good of the orchard requires the removal of the wind-break on the north and the trimming up or thinning out in other directions so as to secure a rather free circulation of air, the wind-break being only useful to the orchard by partially shading the ground and preventing fruit from being blown off.

The best treatment seems to be cultivation; shallow near trees and mulching with manure at the rate of 30 loads to the acre each and every fall or early winter. Cultivation protects against drouth, mulching prevents root-killing and manure keeps up vitality. The bearing orchard that is not well manured will soon starve to death.

The Transcendent and some other crabs subjected to this treatment might blight to death.

Prune early and lightly in such a way as to secure a low top with center stem and moderately sized side branches.

If trees like the Wealthy kill down, allow sprouts to grow up from the ground without pruning and they will soon make bearing trees. But we must be on the lookout that such trees are not eaten by rabbits, or crushed by settling snow drifts.

What shall we plant? After our experiment stations have had a little more time they will be good authority, but for the present read the reports of our State Horticultural Society or apply to an orchardist in your own locality. If you find an honest nurseryman (there are many such) take his advice. It will be safest never to take the word of a canvasser whether he sells trees or anything else.

Where shall we buy? Buy of the nearest nurseryman who has the reputation of being honest.

The far fetched and dear bought theory is the biggest humbug in the world when applied to trees.

Beware of the man who sells wonderful new things at extravagant prices, unless you have plenty of money and love to be sold.

OUR HITS AND MISSES IN ORCHARDING.

BY EDSON GAYLORD, NORAH SPRINGS, IA.

It is but too true we have hit little and missed much. What little we have hit has come to us more by accident or incident than from any system or devised plans. Up to 1884 and 1885 we have most persistently followed the plans our fathers taught us in other climes. It is needless to add that this course brought us to one general wreck in 1885. In short, we were then absolutely forced to stop and look over the wreck and learn, if possible, what were the causes that have led us on to such glaring mistakes.

Our first great mistake was in what has proved a very unwise selection of orchard sites. We selected first the warmest, coziest places we could,

and the more thoroughly protected, we thought, the better, particularly on the north and west. We should have selected the highest location and the one most exposed; a heavy clay loam for soil, and anything but sand or gravel for sub-soil; a northern exposure in place of south or southwest. We can cite hundreds of cases to prove this thoroughly, but all see and admit this now.

We set trees grown too much on tender roots. This is now admitted. We have set our trees too shallow for our warm, deep soil. Our dry winters and extreme freezing and sudden thawings in winter, have killed these tender roots, and our trees have succumbed to the inevitable. Not all from freezing and thawing, but this shallow setting has left the trees loose and has let them grow over to the north-east, and going that way, nearly every tree, as it got age, has gone up by "sun scald."

We have listened to and patronized the tree peddler to an alarming extent when we ought to have had sense enough to have bought of the nearest reliable home nurseryman.

We have missed when we put our calves and other stock into our orchards, and shut the pig out. I will suggest here, to all who have made a tight fence around the orchard to keep the pig out, to use your better sense and put your pig on the inside. He is the most effectual insect destroyer and orchard renovator known. He will stir up every foot of old grass, brush, and the neglected fence corners which are the hiding and breeding places of most insects. He will clean up all wormy apples and destroy untold numbers of orchard enemies. The pig has too long had the name of being a dull, lazy, worthless animal. This is a great error; he is one of the most constant and industrious workers known, in his place, which is in the orchard. The calf will climb a small tree every time, and brouse off its top, and when this is done in midsummer the tree is ruined. I would as soon have an apple tree girdled by mice as broused off by calves.

We have missed in setting our trees too far apart, and in squares. This course has let the sun in on the trunks and made fearful ruin. Set trees on the line of the sun's shadow at half-past one o'clock. Set three trees in a hole and set these clumps not over eleven feet apart in northern Iowa and Minnesota. Set them in "A" form first, one at the head and one on each side back eighteen inches, but set the head of the A on the same line. This plan will surprise you by its superior advantages in not only protecting its own clump, but in the double protection it gives it neighbors. The rows should be fifteen or twenty feet apart, east and west, to admit teams. Closely set trees have succeeded much the best. Trees found on the north side of a tall wind-break or grove have proved much more successful than those on the south. Three of the most successful orchards I know of, in Iowa, are set very close, ten and fifteen feet. One of these is near Nora Springs, one near Cedar Falls, and one near Shell Rock. Mr. Dart, of Minnesota, has some two acres set very close and has been very successful. The best orchard now in the state of Minnesota, grown by William Somerville, is set very close. Hundreds of others could be cited to sustain this evidence, found among the wrecks of our old orchards.

Two styles of trees furnish strong evidence in favor of the form in which they are found; the first are found leaning toward the sun with principal branches on sunny side. These are very few, but are in good condition.

The next are much more numerous. They have grown up from the ground, or very near, and have divided into three or four distinct trunks. These are the largest and most productive trees we have, and are very often found healthy and sound when hundreds of the same varieties have died, in the same orchards, under the selfsame management, and with the same surroundings. We find from one to five of this style of trees in nearly every old orchard in Iowa. I know of but one very large Plumb Cider tree near here; it bears a number of barrels of apples in a year. This is grown with three trunks. The only large Talman Sweet left in this part of the state has branched out near the ground with three large branches; hundreds of others all over here have died out entirely. The oldest and largest and most productive Haas tree I know of is thus grown.

All this living testimony goes to show very plainly that we must have some more reliable and systematic system to protect each individual tree from the steady, direct rays of the sun. While we find this to be absolutely necessary we find that collectively our trees need no protection. We have found many very promising new seedling apples that have given us many hopes that have entirely failed when an attempt has been made to grow them in other places even in the same orchards. There must be some cause for this curious freak of nature. One of the largest and best seedling apple trees in this locality, that outlived everything and bore barrels of good winter apples nearly every season, grows up with three trunks. This tree has been grafted into roots and top worked by many, but has signally failed in every instance. These are some of the many items we have gathered from the wreck and should go on record for future usefulness.

ORCHARD EXPERIENCE.

By C. M. GORDON, LONG LAKE.

I will endeavor to comply with your request that I write you my experience in growing orchards and apples in Minnesota. I presume you are aware that any man that has planted apple trees from time to time for nearly thirty years in this state has experienced anxiety, disappointment and pleasure. We generally value things of this world very much in proportion to what they have cost us, so if I place a high value on my orchard it is but natural. My orchard has cost me some money, a great deal of labor and no small amount of anxiety of a very cold evening. When the wind is in the northwest and a prospect of a much colder night, I feel very anxious about my eight hundred trees that I have growing in orchard, but I console myself as best I can with the thought that I never had but two little orchards swept clean from the face of the earth by Minnesota winters.

I bought the first apple trees that I ever planted in Minnesota in the fall of 1857. I took them to the western part of Carver county and planted them in orchard that fall. In the spring of '58 my trees were sound asleep and they are sleeping yet. This was very discouraging to me for at that time I did not suppose there had ever been an apple

grown in Minnesota and I began to fear there never would be. I never made another attempt until after the close of the war. While I was a soldier in Tennessee I resolved that if I lived to get home I would raise an orchard if it was in my power to do so. Soon after I arrived home in July, 1865, I heard of a man that was selling out to leave the country and had an orchard for sale. I bought the trees, dug them up and hauled them to my present home, on section 32, town 118, range 23, and planted them in orchard that fall. They were a fine looking lot of trees. All lived and grew very fast and bore a few apples the summer of '72. After the severe cold winter of '72 and '73 not a living tree was left to mark the spot where they stood. What prevented me from surrendering to the hard winters I cannot tell, unless it was the endless amount of energy and perseverance it takes to make a fruit crank of a man. I had some young trees of Duchess, and crabs that I had raised from the seed and grafted. I planted them in orchard and soon had bearing trees. From that time to the present I have never failed to raise apples. Have had but very few partial failures except with some varieties too tender for our climate. Since my orchard commenced bearing I have marketed nearly three thousand bushels of apples, principally Duchess, Wealthy and crabs. I have grown a few bushels of Fall Stripe, Fameuse, Tetofsky and Talman Sweet and have fruited Golden and Perry Russet, Sops of Wine, Haas, Ben Davis and Pewaukee in a small way. Planted largely at one time of Wine Sap, Yellow Bellflower, Northern Spy and others, that never produced an apple. I have Fall Stripe in bearing now. It is my intention to try the Fameuse and Talman Sweet again. At the time I was testing those varieties I did not realize the importance of short bodied apple trees as I now do. I am thoroughly convinced that the best trees I have on my grounds are those that start their branches at or very near the ground. My plan now is to train them in the nursery to branch out ten or twelve inches from the ground, transplant in orchard three or four inches deeper than they grew in the nursery, plow between the rows throwing the soil towards the trees, and cross plow in the same way. The cultivation of crops will level it down to some extent but following it up year after year we will raise the soil to the limbs of the trees and form a gradual slope back to the center between the rows. Such training and cultivation is of benefit to trees in all extremes of weather, whether it is wet, dry, cold, hot or windy. A great many hardy roots will start above the graft which increases the strength and endurance of the tree.

You may think me away off to advocate the raising of bushes in the place of trees, but I was forced to this conclusion by long experience. I have fruited a few seedlings but nothing of special value and have a few others that will probably fruit in the near future. I have great faith in the hardy seedlings and Russian apples. My experience with Russians is quite limited as my oldest trees are only seven years old. They all seem to be good apples. The Longfield and Lieby are among the best. My orchard is on a high ridge of land extending east and west, it covers the top and both north and south sides. I have watched very closely for the great advantages of northern slope so often spoken of, but have failed to see much difference. I believe that high land with a good clay subsoil that comes near the surface is the most important of anything in selecting a site for an orchard. I have on hand over thirty choice varieties of

scions for grafting this winter that I have selected from some of the best orchards of this and adjoining counties. There are a few seedlings among them that have never been grafted and quite a number of Russians. I do not claim that my old trees are sound for they are far from it; but they are living and bearing paying crops. I believe if a tree has lived and borne well until it is twenty years old it should be placed on the retired list, and if perchance it should do more it should receive our most heartfelt thanks.

In conclusion I will say that after watching the ups and downs of the fruit business for one-third of a century, its darkest days and brightest sunshine, year after year as time rolled on, I confidently believe that many parts of Minnesota will yet rank high among the fruit growing districts of the Union.

H. L. Gordon: I have not taken up much time at this meeting, but as I have kept quiet until after all the big guns have fired off their ammunition I thought some light artillery might come in at this time. I learned that back in the sixties. I advocate very strongly the growing of a tree with a short trunk. I can see no use for a body of an apple tree except for convenience in planting and getting around under the tree. This, it is true, sometimes causes a little inconvenience, but we save a great many more apples by having the limbs close to the ground, where we can pick the apples from the tops of the trees; there is a great deal more gain than loss. I prefer to pick my apples off the tree instead of from under the tree. In talking with my friend Brand the other day he said he was not particular whether they adopted his method or not, but said they would all come to it soon. I told him they would come to my plan. I know it is natural for a man to think his ways are right.

THE FUTURE OF ORCHARDING IN MINNESOTA.

BY J. M. UNDERWOOD, LAKE CITY.

By what prophetic vision shall I look into the future and see the fruits it has in store for us. Shall I seek some enchantment and weave a web of fancy in which I can discover a key to unlock the mysteries of years to come, that I may be able to tell how many and what kind of apples Pres. Elliot is to have on hand? This must have been his motive in assigning me this topic, that he might know whether to contract ahead with some Michigan or Missouri man, or if he is to have the highly colored, delicious products of Minnesota.

I might base my judgment on the unfolded future of Bellamy's "Looking Backward" and promise each family a full supply of sweet and sour harvest, fall and winter apples, in size and color to suit each fancy. This would certainly be a pleasant way to treat the subject, but my life has been too full of the hard details of experience to admit of forgetting

them, for fancy's pleasure, and I am thus compelled to base my judgment on my own experience and observation. If then you ask me shall we be able to grow apples successfully in Minnesota, I answer yes; for if a person without experience on a poor location and soil not adapted to orcharding, has still been able to grow them to a profit in the past, it is a pretty good guarantee he can do even better in the years to come. Notwithstanding all that has been said and written about soil and location, we find most of the trees planted with seeming indifference to the best counsel in these particulars. In the yard or garden, regardless of soil or exposure, is where they are generally put. For the other products the farmer looks over his ground and says that piece is best adapted for hay, it is low and level; hay will grow well there and it will be easy to mow. One piece is high and rolling, has good circulation of air, and wheat will do well on it. Another piece is adapted to potatoes; still another to corn; and so they are planted there. But the orchard is planted convenient to the house, whether it is a good place or not.

Now, if we consider what we have suffered most from, it will indicate what we most need to provide against. Of one thing I feel certain, that excessive drouth has worked greater injury to our orchards than anything else. We could hardly have less moisture than we have had the past five years. The drouth must have reached its height a year ago and culminated in the general destruction that befell not only fruit trees, but shade trees with surface feeding roots, such as hard maple, soft maple and elms, which together with evergreens, shared the same fate. How was it done? Just like hanging clothes on the line to dry, every particle of moisture was exhausted from tree and ground, the roots perished, turned black and circulation ceased. Although these conditions were general throughout the state there were many exceptions. In some places there was more rainfall than in others. Some soils were better calculated to hold moisture. Some exposures could better withstand a drouth. With a clay soil on the shady side of a hill evaporation does not take place so rapidly as with gravelly soil on a level or a sunny side. So that persons who have a particularly good location should take advantage of it by planting largely, while less favored ones can plant fewer trees and bestow greater care on them. One must not expect to plant and care for trees here the same as they do in New York state. If it is less natural for them here than there, we must study to overcome the difficulties. We may not grow celery in our gardens with the same ease they grow it at Kalamazoo, but we can all learn to grow it well.

Perhaps we shall never grow tired of recalling to our minds the trophies we have won where our Minnesota apples have come in competition with eastern and southern fruits; but I will not recount the past for I must speak for a moment of the present. The facts are, Minnesota is producing quantities of early and fall apples and crabs already. In Wabasha and adjoining counties some farmers raised last season more than they could use and give away. They did not know how to put them on to the market and so they allowed them to go to waste. "But," says one, "I haven't a good location, and must use the one I have." In that case then try and overcome its defects by the best of care. While the trees are young cultivate well, as they grow old manure and mulch liberally. One thing we must make up our minds to. That is, trees will not live to be as old and

grow so large as in other states. We shall have to plant new orchards oftener, but there will be one advantage in that; young trees bear the best fruit, it is larger, fairer and better colored.

If there is one thing more than another that has been emphasized in my experience and observation, it is that the best of care is necessary to success, and one better not plant more than he can care for well. Thus far I have said nothing as to varieties. Not that I think it unimportant what we plant but it has seemed to possess us to look for something as we say *hardy*, something like a fence post, that can stand anything, and thus forgetting to bestow the care we ought on what we have. I believe much progress has been made in developing hardy and good varieties, and we have only just begun. Our society has had years of exceeding interest and usefulness but the future has in store richer developments than we have yet experienced. Some varieties we already have will stay with us, notwithstanding disaster has at times overtaken them. The Duchess and Wealthy, even on poor locations, have, with good care, paid well; they bear young and abundantly, and as we learn better how to care for them they will always be favorites and prove profitable. Some of the Russians and hybrids are desirable and have come to stay, but I feel the line through which our greatest good is to come is in the development of *seedlings*; at least everything seems to point in that direction, and why not? Every apple, no matter how old the variety, at some time in its history was known only as a seedling. It has been a long and tedious process to sift out and save the good ones and reject the culs, but it has brought us all the beautiful delicious apples with which we are familiar. And in like manner must we seek for what we need to meet our wants, and we shall be sure not only to find hardy kinds of good quality we know not of, but later keepers than we yet have.

How many are there in this society? How many in the state that are saving seeds from hardy apples and planting them? Not many I think. But let the numbers be increased as it will, when people generally understand that from the cross-fertilization of our hardy kinds they stand a good show of getting something better than they now have. Here is interesting work, for old and young, boys and girls may with a little thought and care, in this way provide something valuable for their future, and the old of both sexes may yet immortalize their names by planting the seed from which is to grow the hardy late keeper we are looking for.

I truly think our society can do more good by stimulating this branch of our work than in any other way. Give liberal premiums for new seedlings and keep a good seedling committee at work to watch for new things and to collect and bring them out to our meetings and so "keep everlastingly at it;" not waiting for something to turn up, but determined to turn something up, and the future of orcharding in Minnesota will be a pleasant and successful one.

DISCUSSION.

C. H. Gordon: I would like to say, in addition to what Mr. Underwood has said in regard to his hard maples, that I have a piece of heavy timber where I raised ten thousand hard maples,

and within the last five years at least three-fourths have died off in the same way Mr. Underwood's died.

Prof. Green: I notice they suggest we should follow nature. I do not like that term. I think man can improve on nature. Nature is improving herself in everything all the time, and man can go a great ways to improve nature.

M. Pearce: I think all we can do is to assist nature.

Geo. J. Kellogg: There are a good many points in the paper; it is the best paper of this morning. That plan of setting out the orchard, you cannot emphasize too much to your farmer friends.

E. H. S. Dartt: There is a point in Mr. Underwood's paper that I think is somewhat important, and that is in regard to the killing out of hard maple. He seemed to intimate that it needed forest protection. I think that is a fact; at any rate, in our section of the country the hard maple is not long lived. It seems to do best where other trees are growing around it and shading it. I think it is shown to be a fact that it needs forest protection, that it needs shade. There are many other varieties in the same list, but the hard maple is emphatically one of that kind.

APPLE GROWING AROUND LAKE MINNETONKA.

BY A. W. LATHAM, EXCELSIOR, MINN.

This title may include a history, a realization or a prophecy. The history of apple growing, which is as old as the settlement of the region, is not a record of success as is most other branches of agriculture, but rather a record of failure. What it teaches is rather how not to do than how to do. It is better known what cannot be grown and how they cannot be grown than what to grow or how to grow it. Such being the fact this history is one of humiliation rather than of pride. The earliest settlers of the region being from New England, the home of the apple, planted freely the varieties that thrived in the orchards of the land that gave them birth, and apple seed by the bushel, in the case of some of the pioneers, was buried in hopes that kinds adapted to the region would arise from its native soil. A succession of mild winters fostered hopes that kinds had been found or originated that were equal to the demands of a Minnesota winter. Hopes altogether vain. Where fifteen years ago were thriving young orchards of Plums Cider, Fall Stripe, Ben Davis, Duchess of Oldenburg, etc., and a multitude of thrifty seedlings, there remain now only here and there, singly or in small groups, that faithful friend, the Duchess of Oldenburg, still in the fight but badly shattered, and occasional young orchards of Gideon's justly famous seedling, the Wealthy.

The present status of apple growing at the lake shows now in existence only these two varieties, out of all those thriving fifteen years ago and a goodly number of seedlings more or less promising, largely crossed with the crab, but none of them sufficiently tested by the local public to be entitled to a name in this article. Of the Duchess a few trees still stand, dating back the fifteen years, bearing the scars of old age and of hard living under adverse circumstances. Of the Wealthy, few or none of the older trees remain, and this variety is now represented by trees planted within the last decade. Neither of these kinds can be called hardy or entirely successful, but they are partly so and sufficiently so in localities to make their culture profitable. Experience shows that a severe winter will cripple them, and a succession of such winters is likely to kill them, so that their average life is short, probably inside of twelve years. As an offset to this serious drawback there are these advantages, that they come into bearing at a very early age and their fruit brings a high price in the local market. About Lake Minnetonka the country is generally rolling and hilly and the soil a dark, strong loam of perhaps one foot average depth, with a subsoil of yellow clay full of limestones. The small orchards throughout this region that have proved profitable are mainly upon this kind of soil and subsoil, located upon high ground and very generally upon east and north slopes.

Without taking up the time to go into the reasons for this, observation and experience show that these kinds of soil, subsoil, location and slope bring about the best results in apple culture in this region. The planters who have accidentally or with intelligent purpose observed these conditions have largely found the culture of these two varieties profitable upon the limited scale they have worked. The outlook for this branch of horticulture certainly offers a reasonable degree of encouragement. There is ground for an intelligent hope that seedlings have already or soon will be originated that will give hardier and better keeping apples of good quality. It is also reasonably certain that if planters have the nerve and persistency to plant the two varieties named, under the conditions suggested, give good cultivation and reasonable care, keep the vacancies filled as they die out from whatever causes, that in a term of years the ground so occupied will yield more income for the labor performed than any other use to which it can be put, even in the famous fruit growing region of Lake Minnetonka. An intelligent use of the ground requires that some cultivated crop be grown along with the trees, not only while young but continually. Let there be no such thing as seeding down, but steady tillage year after year while the tract is used for an orchard. Raspberries, currants or blackberries are an excellent crop to fill up with and will produce almost as much as though the trees were not there, limiting the cost of orchards almost to that of planting the trees. The north and northeast slopes of the higher hills about the lake should be planted with Duchess or Wealthy apple trees, the amount to be limited only by the area of land so situated, and it is confidently predicted that the results will be a most agreeable surprise to the planter. Plant corn or potatoes or what cultivated crop you will, but if you have north or northeast slopes on high land and clay subsoil plant freely by the acre 18 feet apart. As an illustration of what has been accomplished—one hundred Wealthy trees, two years old, planted on three-fourths acre, yielded in the ten years they sur-

vived, over \$400 worth of apples sold, and the same ground produced all this time a heavy crop of Black Cap raspberries, so that practically the cost of the apples was limited to the expense of planting the trees and gathering the fruit. Planters about Minnetonka of late years have neglected the apple tree, by which they are the losers. No one can afford to farm land situated so as to afford a reasonable show of success of growing apples. Compare \$40 or \$50 per bushel average receipts for a term of years with the profits of corn or wheat growing. The chances are certainly greatly in favor of success in the direction of apple culture under right conditions; and the prophesy in regard to apple growing at Lake Minnetonka is that those who set about it intelligently and persistently will in due season reap a suitable reward.

DISCUSSION.

Pres. Elliott: I wish to ask Mr. Somerville in regard to seeding down; I see Mr. Latham recommends continuous cultivation.

Wm. Somerville: Seeding down with me has been a success, but understand me right, before it is seeded down there is little grass that grows there.

Pres. Elliot: Before he seeds it down he uses the hog cultivator.

Dr. Frisselle: I think the point Mr. Latham brought out of raising more than one crop on the soil the same season ought to be spoken of. I do not think two crops can be grown successfully at the same time. If an apple tree is to be grown I think better grow that and not try to crop it with corn or potatoes at the same time. There is a principle in philosophy that ground cannot be occupied with two things at the same time.

R. P. Lupton: I think I understood Mr. Somerville to say that he advised planting small fruits the first two or three years.

Wm. Somerville: When I set out my trees I cultivate them three years. In those three years they are under cultivation any kind of small fruit may be raised among them, but when the trees get large enough to bear I think it is inadvisable to raise anything among them.

A. W. Latham: I want to say in defense of my position that the theory of cultivating only one crop on a piece of ground at the same time is a correct theory, but practice sometimes does not support theory. It is also the correct theory to seed down an orchard as Mr. Somerville has just said, but if you have an orchard of trees growing in a country where they do not long

survive, it would be unprofitable to seed it down with the expectation of raising apples only. Apple trees about Lake Minnetonka, as far as my experience goes, as a rule, never reach the time when they become profitable as an orchard, but they begin to die off as soon as they begin to bear, and the only way you can make this orchard profitable is by raising something else on the ground at the same time. It is not a matter of theory with me, because I have had a good deal of experience, and I would not think of such a thing as seeding down an orchard on my place. In my experience I had two orchards planted side by side; in one I planted raspberries, and I had just as good a crop of raspberries from that orchard as if the trees had not been there. It cost me nothing to have those trees standing there. After they had been there four years they came into bearing, and within a year after that the trees began to die off, and at the termination of ten years there was not one tree left, and that is the way you have got to grow apple trees around lake Minnetonka. I took from that piece of ground over four hundred dollars worth of apples during those ten years. Now those apples cost me nothing except planting the trees. If any of you gentlemen about Lake Minnetonka who plant apple trees will try to raise something else on the same ground with your apples, it will pay you for your trouble.

Now in the other orchard that was not cultivated we gathered a few apples, but not one-tenth as many as we did from the one that was cultivated, and they were inferior in size, the crop was small, and the trees also winter killed. It is different with Mr. Somerville; where he lives he plants trees with the expectation of keeping them thirty years. He has an orchard; we have no orchards.

H. L. Gordon: Mr. Latham speaks for the south side of Lake Minnetonka only. I live on the north side. I have trees that are twenty years old and are bearing regular crops. My oldest lot of Duchess now average two hundred bushels an acre and I call that a paying crop. They are still living and have borne crops ever since they were six to eight years old, and with the exception of one year I have never failed to get a paying crop. There was one year that I only got four bushels, but I can say that it was the only partial failure I ever had. I approve of Mr. Latham's way of setting some raspberries with them. I cultivated the ground until the trees were some ten or twelve years old, until the limbs were in the way,

and then I seeded it to clover. I mulched around the trees with hay and kept the grass killed around the trees. As long as I cultivated the ground at all I raised a good crop; and I did the same with my young orchard, in which the trees were six years old last spring, and I still cultivate the ground there. I did it from a farmer's standpoint, and yet the trees are doing well enough to permit the fruit of sporting the blue ribbon on the table yonder. My trees are eighteen feet apart each way.

A. W. Latham: I want to ask Mr. Gordon if those Wealthy's on the table were raised from trees twenty years old.

H. L. Gordon: They were six years old. I cultivate the ground just as long as—

A. W. Latham: You will have no trouble in cultivating the ground until they are all dead.

H. L. Gordon: Perhaps not, but I would rather think they would bear themselves to death. I believe the Wealthy is just as hardy as the Duchess today. Last year was really the first year, they bore to amount to anything. I have been troubled a little with blight. The Wealthy has blighted somewhat more than the Duchess.

Wm. Somerville: His success has been somewhat similar to mine, and when I set out an orchard I am not expecting a failure, hence I set out fifty trees in 1862 and there are now forty-nine of them living, and they look as though they were good for another half century. My success has been very good, and my trees have been bearing fruit for me for twenty-five years, and I have never experienced a failure in that time.

A. W. Latham: I want to say just a word more. Mr. Gordon's statement only confirms my own view of the matter. There are some Duchess trees in our neighborhood twenty years old. With the Duchess it is precisely the same as with the Wealthy. If you plant them in cultivated ground with some other crop you can just as well raise a large crop of large apples as if you put them in grass. Now, to support this, I have side by side two lots of Duchess, one in the grass on a side hill and one row in the garden, that I planted sixteen years ago. One-fourth of these trees are dead, but most of them are alive and bearing. In the grass on the side hill are several times as many Duchess planted at the same time. There is no comparison, whatever, to be made between those trees. Those in the cultivated ground have borne four times as many apples as those standing in the grass, the fruit has been fully one-half larger, and I have been able to get more for them.

H. L. Gordon: From my own experience, I would not plant trees close enough to shade the ground. I think we must give a tree room to breathe in order to let them live.

Geo. J. Kellogg: Mrs. Gordon remarks to me confidentially that the trees were better after they were dead; that is, they bore better from the sprouts or suckers that came up from the roots than they did before.

Mrs. Gordon: There were only a few sprouts from the roots of a Wealthy that came up and bore well.

H. L. Gordon: I hardly ever take issue with my wife; if I do I give her a curtain lecture; but I agree with her that we have trees, some of those old Wealthys that I spoke of, that killed themselves bearing, that are now bearing trees from the sprouts, and I believe they are of more value than the old trees ever were, and I believe I have got trees there that will do more, ten times over, than the original trees ever did.

PROTECTING APPLE TREES.

BY SETH H. KENNEY, MORRISTOWN.

Mr. President and Members of the Minnesota State Horticultural Society:

In my early youth I grew up in Franklin county, Mass., where successful orchards were the rule. I early acquired a love for the orchard. In the year 1857 I came to Minnesota. Almost one of the first things after securing the land, I bought trees and set out an orchard. To tell the story of my failures, would be to relate the story of every one of you present. I have been to the meetings of this society for many years, but for many years I did not set out any more apple trees, regarding the investment as *money lost*.

In the month of April, 1888, I rented a piece of ground to plant sugar cane that had the remains of seven acres of what once gave promise to be an orchard. I was digging out some of the remaining trees that were nearly dead and found some of them that were nearly or quite girdled with field mice many years ago when they were first set. In order to save them I banked up with mounds of earth. On digging up these trees I saw that the bark and trunk up as far as the earth came looked remarkably healthy. I took a saw and sawed off the tree in several places and found the wood white and sound clear to the heart. It was this way clear to the top of the earth mound and no sprouts had grown from the part of the trunk buried. It was as large as the trunk above the earth, and had been buried for at least ten years. There were several trees that had been banked and all the same results, healthy wood as far up as the earth. This experience led to the following conclusions, that if the trunks of apple trees when set out were boxed high enough to cover where the limbs branch out from the main trunk and this box filled with earth so to secure a division of the sap before exposed to the sun's rays, the points of danger would be overcome and the following points of ad-

vantage secured: First, a box eight inches square filled with earth, will keep the sap from going up too early; it will give the trunk a more even temperature in severe weather: it will insure perfectly healthy wood as far as the trunk is concerned. It is well known by nurserymen and horticulturists that where young trees have been dug from nursery rows in the spring and set in orchard, not one-fourth of them will grow. This treatment of trees will increase their vitality and after a hard winter they will pay for this protection. No mice will girdle the trees, no rabbits, no apple tree borers can get at them. The trees cannot grow prematurely old that always keep a perfectly healthy trunk. Is it unreasonable to suppose that the earth that protects the roots of our trees in case of tender trees like the apple, cannot be extended up to protect the most vital portion of the tree? There is no better place than Minnesota to get a good growth on apple trees. The next thing in order is to save that growth in a healthy condition.

In the fall of 1885 I had quite an orchard of Wealthy and Duchess apple trees that bore a heavy crop. The following winter I lost all the Wealthy trees but two, and eight or ten Duchess. I fully believe if I had known what I have now learned I could have saved those trees in a healthy condition. One year ago last fall I set a Peerless apple tree, and boxed it filled with earth. The past season it made a fair growth, proving that boxed and filled in about the trunk, young trees can safely be set in the fall. In June 1888 I commenced to box some bearing trees, they have been boxed ever since with the best results. One of the trees bore, as near as parties could estimate, 6 bushels. I became so confident of my ability to raise an orchard that last October I bought of John P. Andrews, of Rice county, 100 Duchess and 400 Wealthy. I set 300 Wealthy and 100 Duchess and boxed every tree, filling the boxes with earth. The boxes were made 30 in. high, 8 in. square. It took three weeks work to make the boxes and set the trees. Mr. John P. Andrews and I agreed that we never had seen any apple trees with dead limbs that the trunks were not first injured. We then visited his extensive orchard and in every case where we found dead limbs the trunks had been injured. Mr. Wm. Wochton of Faribault, had Duchess nearly killed in winter and spring of 1886; by covering with gunny cloth, the injured portions have healed over. The boxes were banked outside with earth to keep them in upright position. After I set them I mulched most of them with manure, thinking it would be better protection for the roots. The boxing is now quite often used, especially in Rice county, and it is generally thought good results will come out of it. Should it prove to do what we expect, it will add greath wealth to our state, and instead of capturing the Wilder medal once, we can do it every year.

HOW TO MAKE APPLE TREES LIVE FORTY YEARS, AND BEAR TWENTY BUSHELS OF APPLES IN A YEAR.

By O. F. BRAND, FARIBAULT.

I have been requested to write on the subjeet of "Protection of Fruit Trees from the Nurseryman's Standpoint." According to the program I have been preceded by the "Farmer's Experience" on the same subject.

It would look as though the nurseryman's standpoint intended for me to write from was that of his personal interest in the matter, or, in brief, to so protect trees as to have the largest share of them die, so as to make a market for more trees. I have concluded not to write from such a standpoint.

I have been a student of the school of tree protection all my life, and for the last five years a diligent student. In the summer of 1885 I was traveling in Florida and Tennessee. The diseases of the Citrus family of trees was one that particularly engrossed the attention of the orange growers of Florida, and it was at that time and during my investigations there, that I think I learned the cause of and how to prevent one of the worst forms of blight. Returning to Tennessee the last of June, that summer, I found the pear trees nearly all killed or partly killed with blight. A neighbor of mine had a fine Flemish Beauty pear tree the limbs of which were killed nearly to the trunk with blight. He asked me if the tree could be saved. I told him it could. He bought 4 quarts of lime and 2 lbs. of sulphur. I put the lime and sulphur into a keg and poured on to that mixture about 4 gallons of boiling water, adding at the same time about 1 oz. of crude carbolic acid. I then took an old broom and applied that wash while hot to the trunk of the tree and up into the limbs as high as I could reach. I think I spent a half hour washing that tree, and must have washed it five or six times over. Now, for the result: It was about the 15th of July. The growing season was long past. In less than a week a new growth had started from the lower part of the limbs not killed, which new growth went on and matured in fine condition a new top of from $2\frac{1}{2}$ to 3 feet. A letter received last spring from the then owner of the tree gave the information that it had borne a good crop of pears every year since.

Pathologically considered, I make up the case like this: the tree lacked certain elements of plant growth which are largely supplied by lime and sulphur in solution. If these elements, were in the soil, the condition of the soil and atmosphere were such that they were not available as plant food. The conditions of the atmosphere were most favorable to the development of blight; the bark of the tree, not being suitably supplied with the necessary elements of normal growth, became hard and somewhat contracted so there was not room for the downward flow of sap. This sap thus arrested in its downward flow in very hot weather, soon became proper food for disease, which extends through any open tissue, or perhaps through the stomata of the leaves, and death ensued. The liquid being applied *hot* to the bark caused it to expand; the lime and sulphur being in available form for immediate use as plant food, were appropriated at once, and, added to the reserve force in the tree, began to supply a perfectly healthy sap. Whether or no the lime, sulphur and carbolic killed the disease, I am not certain. It may be that nature fought its own battle, and conquered the disease when put in a condition to do so by the aid of the hot wash.

In the protection of apple trees from the adverse conditions of our climate, my experience has been long and varied. In 1867 and '68, I protected all my one year old apple trees by covering them up with earth. There was about 1,000 of them. Their growth the second summer was remarkably healthy. In 1874 I began protecting my small orchard trees

from the sun by tieing corn stalks, hay or pigeon grass on to the trees. This protected them from the sun somewhat but not so well as tarred paper which I began to use in 1876. I was strongly of the opinion that a serious injury to a young tree would consign it to an early grave. And I remember in 1873, after having cut off more than 50,000 trees, that in conversation with an old nurseryman, now prominent as the superintendent of an experimental station, he said it was a foolish thing for me to have done—that such' trees, although with a small amount of dead wood at the heart, would make good orchard trees. Time has cured him of that idea. In 1886 I became thoroughly convinced that the great destruction to our iron clad list was to a great extent occasioned by improper care of young trees. Among other causes that led me to this belief was the undue proportion of old Duchees trees—trees planted prior to 1870—as compared to the number alive of trees planted since that date. Here let me remark that out of the immense number of Duchess planted since 1872, the per cent of those now alive is very insignificant. Now when we find the true reason why these old trees lived, while millions of younger trees died, will we not possess the knowledge that will aid us in completely mastering the solution, in solving the knotty problem of successful apple growing in Minnesota? Let us look into the history of those old trees. Few, if any of them, were grown in Minnesota nurseries. They were all healthy trees when planted, many of them coming from New York. Some have claimed *that* the reason why they lived the best, but I have disproved that on my own grounds. In 1876, I planted 92 Duchess in one block, trees six feet high. They were eastern or Illinois trees, perfectly healthy. Lacking eleven trees to fill out the block, I dug that number from my own three year old trees and finished the block. All had the same care. The eleven trees of my own growing are the best now. I do not think the climate, in which the old trees now alive were started, was the true reason of their long life. More than one thing contributed to their favorable chances. They were healthy when planted. The seasons were favorable to early and ample growth, and a full supply of reserve food materials was stored up in the trees each year year by healthy leaves. The seasons were right for healthy tree growth. The autumns were right for perfect maturing of the wood—the elaboration of the sap into perfect woody fiber. There were no winters during that time that seriously injured pear trees, consequently there was nothing to prevent those young thrifty growing trees from being comparatively healthy, of course they could not be in *perfect* health in this climate, but approximated closely to that condition. They were in the best condition when struck by the winters of 1872 and '73 and had passed the critical period of their existence, which is the first five years in the orchard. To substantiate this view of the subject I will mention one instance in my own county. About 1860 a French gentleman planted an orchard of about 100 trees—being afraid of injury from rabbits he banked the trunks up with earth about two and one-half or three feet and also wrapped the tops with hay. This was the best protection he could have given them; the trunks being banked with earth they were kept from becoming *black hearted*. In 1865 he sold the farm and only ordinary care was given them after that time. In 1873 all but seven Duchess killed; they are now the most productive trees in our county and the fruit is always large and fine,

13 bushels have been gathered from one of these trees in a year. The owner says he has never had anything on his farm that has paid him so much and such easy money as the seven trees. It was the banking of earth when they were small that kept them healthy, and the bearing of large crops of fruit now is but the persistency of inherent tendencies.

Let us examine a giant of the forest to ascertain the reason why he towers so far above his fellows. In the absence of positive proof we must accept circumstantial evidence as to what was its condition in its infancy and early life. We take it to the saw mill and as plank after plank of clear lumber is taken from its broad sides until the heart is reached the evidence is conclusive that there were no wounds or bad spots in it when young. It has been my experience and observation in a saw mill that the knotty lumber does not come from the forest giants, but from a smaller class of trees, and we cannot escape the conviction that these exceptionally large trees grow very rapidly and in perfect health when young. How many knotty, rotten and worthless trees there are in the forest and yet, within certain limits, all might have become giants had their environments been suitable during their development up to their 50th year, but more particularly during the first ten years. The plan of protecting apple trees with earth and boards I first saw in Pierce county, Wis., in the winter of 1876; as I remember it they were protected in that way up 3 to 4 feet from the ground; they were trees that had probably been planted three or four years. I saw them in July following and noticed they had made a remarkably fine growth. I have never been there since, so do not know what condition they are in now.

In 1882 I had 102 Duchesses protected by driving boards around them and filling in with earth. This protection was left there till it gradually wore down. The earth was from 18 to 24 inches high. These trees were eight years old from the graft when banked up. They are now the best trees I have for their age. Mr. Gregg looked at them in 1888 and said that he was surprised to see such a fine lot of Duchesses in Minnesota.

It was in the summer of 1888 that I first saw the seven old Duchess trees before mentioned, and when I heard how they had been cared for when young it came to my mind at once that I had found the true reason why so many of the Duchess trees planted prior to 1870 were now alive. It was because they did not get materially injured when young, and being comparatively healthy up to the time when their roots had probably made a growth of from eight to twelve feet in all directions, with a bark healthy, uninjured by sun scald, and an amount of sound wood in the trunk sufficient to carry them through adverse climatic changes which killed or seriously injured black-hearted, sun-scalded trees.

This is an absolute law underlying the growth and development of all living things, namely: An animal or plant (tree) must be retained in its normal (that is healthy) condition during infancy and youth that it may attain to a perfect physical development upon arriving at maturity.

I know of but one cheap way to carry a tree through its early stages to perfect development, or to a size large enough to produce ten bushels of apples in a year. In this climate nearly all fruit trees become *black hearted* while small. To have a tree profitable at thirty years of age it must be kept from becoming black hearted while young.

Here is my plan: Plant in the fall if the trees are less than six feet

high. If the trees are larger, cover them up in clean moist earth, roots two feet deep, top six inches. If the location has a sandy subsoil the trees should be set six inches deeper than they grew in the nursery. The holes should be five feet across and three feet deep, and in planting fill the holes with rich clay loam. If the subsoil is clay dig the holes large enough to let the roots extend in their natural shape. Cut the ends of all roots smooth with a sharp knife. Fill the holes full of *mellow*, rich surface soil, stamping firmly the first six or eight inches in the bottom of the hole. If the earth is dry put a pail of water on after filling the hole one-third full, and let it soak in before filling the hole. Make a box out of boards eight inches wide and the height of the tree. Set it around the tree; then fill with fine earth. Bank up outside a foot high, and after the ground freezes cover the bottom with straw manure and the tree is safe for the winter. Remove the straw, box and earth after the frost is out of the ground in April, and the tree will make a good growth the first season if the ground is kept well cultivated till 10th of July. Don't cultivate later than that each year. A thin mulch applied to the ground then will be of benefit to prevent the growth of weeds and retain moisture. The mulch should extend four feet each way. About the last of October put up the box and fill with earth again up to and covering the lower forks or crotches of the tree; remember this. The first winter the limbs and trunk should stand in the earth, and the second winter also, if it does not bend the limbs up too much, but if the limbs are too large to bend easily let the box only come up so as not to rub the limbs. A tree once frozen up solid in earth remains so till the earth thaws in the spring and the frost comes out of the tree through the earth instead of having the sun take it out several times during the winter and spring. A tree protected in this way, with three inches of earth and an inch of board will not freeze as hard by twenty degrees in an extreme cold time as a tree exposed to the weather, and if protected, a large share of the starch and other substances stored up in the body of the tree (mainly by the leaves in the summer) will remain there till spring and aid in making a vigorous growth the next summer; while if not protected the starch and other reserve food substances will have been largely exhausted from the trunk of the tree by spring; and the cellular structure of the wood disorganized by the cold, freezing and thawing, will become what we call black hearted. This plan of taking care of the trees must be kept up for five or six winters. The trees will then be as large as they would in eight years without any protection, a gain of two or three years in five. The tree will then be in a much better condition to stand extremes of heat and cold, drouth and winds than a sickly, black hearted tree. Its roots will have run twelve feet in all directions and the tree will then be able to take care of itself, and if not abused afterward by bearing too much fruit the first four or five years will live to be forty years old, if it is a tree with a constitution like the Peerless or Duchess. The difference in the capabilities of a tree well cared for and one not cared for will be as follows, five years after being planted:

Trees cared for by this plan produce from 5th to 10th year, 15 bushels; 10th to 15th year, 20 bushels; 15th to 20th year, 40 bushels; 20th to 30th year, 100 bushels; 30th to 40th year, 125 bushels; making a total crop of 300 bushels. Three hundred bushels valued at \$300. Now look at the average tree with common care, lives fifteen years, bears in all five bushels, value \$5.00. Difference in value \$295.00.

A person who has *good* trees needs but a few, and can well afford the little time required in their care. The labor on each tree, if protected for winter according to my plan, will not exceed five cents a year for five years. After that a trough or two boards set up on the south-west side, will protect the trunk from the sun in winter and spring, till the tops get large enough for protection. The trunk should be from three and one-half feet to five feet high. Cut back the top on the north and north-east side to throw the growth to the south-west. Cut out all inside limbs not wanted, about the last of March or last of June. Cut close to the tree and cover wound with wax or mineral paint. After five years of good care seed down to clover, and make a hog pasture of it, or cultivate with hoed crops. If pastured with hogs, take in a much larger field than the orchard for them to run in. If the orchard is pastured, the whole surface should be manured every other year after the ground freezes. Don't expect ten to twenty bushels of apples from a tree every year without feeding the land well. Distance apart—twenty to twenty-five feet apart will be found plenty close when trees get old. If planted on the quincunx plan with rows twenty-one feet apart, about one hundred trees can be set on an acre and the trees will stand about twenty-one by twenty-four feet apart. Don't plant a small apple tree within forty feet of a timber tree, nor nearer than twenty-five feet to another apple tree; it had better be thirty feet away. The apple tree that bears the most fruit of any tree I know of stands more than fifty feet from any other tree. Forty years residence in the northwest has taught me that these ideas faithfully carried out will yearly be worth millions of dollars to the people of Minnesota. The bark of trees *must* be kept good and free from wounds, and the bodies *must* be kept healthy.

The advantages of boxing trees up with earth during their first five years in the orchard, as has been shown, are many. One advantage, not heretofore mentioned, of this plan is that it permits pruning the tree to suit the taste of the owner and having the wound heal perfectly without leaving a dead spot on the tree. The top can easily be thrown to the south and southwest, where it is most useful, as the top will go in the direction of the greatest flow of sap. The inherent tendency of the apple tree is to make a bushy top with no central stem above a certain point, therefore with a healthy trunk the position of this bushy top is *entirely* under the control of man, and can not only be made to shade the ground on the south side of the tree, thereby preventing the escape of moisture by action of the sun, but can also be made to shade the trunk and the forks of the tree from sun scald. We need not trouble ourselves about sun scald in old trees that have been kept healthy while young. They will *not* sun scald. Another advantage in boxing is to enable the tree to form a plentiful supply of large, vigorous leaves early in the season, which will enable it to make an unusually long and healthy growth, a growth which we cannot get from a young tree when the ends of the limbs are killed or partly killed, and the trunk so exhausted by alternate freezing and thawing that the tree is very much in the condition of a calf wintered on the invigorating sustenance to be drawn from a straw stack, surrounded by that too common barn yard windbreak—a barbed wire fence. We all know that that kind of a calf never becomes the prize ox or the premium butter cow. This early, vigorous growth is essential, as I

have shown in my reference to the forest giants, and the same principle is now held to be a fundamental law in the successful production of all classes of live stock or crops of any kind. Earth is one of the best things I have ever known to aid a diseased tree to recover from injury. At the time I mentioned being in Florida there was a disease called mal de goma, or *foot rot*, killing the old orange trees. One large tree I examined the top of, which was nearly dead (no new limbs having been made the previous year), had but two small live roots—the bark on all the other roots being entirely dead—the dead bark extending up the trunk of the tree more than a foot. I told the owner to remove the earth around the base of the tree and wash it thoroughly with the wash I used on the pear tree, heretofore alluded to, and then bank up with earth a foot above the dead bark. He did so in April. I saw the tree the next December. It had made a remarkable growth, some of the new sprouts measured nine feet in length. Of course, in this case, the hot wash aided materially in producing such a growth, but without the banking of earth I presume the tree would have died. In this climate, deprived of the necessary moisture which is always to be found in sufficient quantity in the atmosphere in the most favored localities where apples grow, we must in some way give the tree advantages which would not be needed in a climate where the environments of the tree were right for its perfect development. Several hundred men have planted and boxed up their trees this last fall, and the public will be able to testify to the value of the plan by another year. I trust all those who are looking for light to aid them in growing apples in this state will carefully consider this plan.

DISCUSSION.

Pres. Elliot: Now, gentlemen, you have heard these two papers, now go to work and pick them to pieces. We do not want anything of this kind to come in here unless we are satisfied it is right. We have had too many of these things heretofore that have been of no use to us.

M. Pearce: I take altogether a different view of the case. Now the best teacher on the face of the earth is nature. You take any tree that starts to grow on the prairie and the very first thing it does is to branch low. That is nature, and if you let that tree go on and never molest it in any shape or form, that tree will live, it will never die. Now the form of that tree will be a low top. You top a burr oak tree on the prairie and the branches come out low down. Now for years I have been pursuing that plan. Your boxing and wrapping is all superfluous and unnecessary. Come right down to nature and you will never fail.

Wm. Somerville: I will say that I am in favor of protection of any kind. I have never tried the experiment of Mr. Brand.

I protect by mulching around the roots of the trees. Now I think this sun scald can be remedied just as well without boxing as it can with it. Of late years I have been setting my trees leaning towards the south-west, and if I can get the trunk to grow properly in that direction and by low heading I am not afraid of sun scald, neither do I want anything like boxing on my trees, and I have succeeded in raising a good many of them. Now, how do I keep them in that form? If you will go to my orchard you will find one hundred trees that have been set two years, and I have tied them over with a cord. I take some twine that we tie our wool with and tie them up so high, and I stick a stake in the ground toward the southwest. Why do I do this? Because in that direction, the southwest, the sun has not the same impression on them as if they were planted in an upright position, and in that form every tree that I plant and have planted for a number of years invariably lives, and I think by following this plan we can save the boxing. But I do not discard it; if that is the best and the only way to save the tree I am willing to try it every time.

O. F. Brand: Mr. Kenney was one of those men three years ago who was like ninety-nine out of a hundred, said he could buy apples cheaper than he could raise them, and would never plant another apple tree in Minnesota. I wanted to stop his mouth and I convinced him he could raise apples by this plan. He has given me no credit for telling him about this plan, and now he has planted four or five hundred trees.

J. S. Harris: About thirty years ago I set two trees of the Seek-no-further. One of them I wrapped, the other one I let alone, and the first produced more of as fine Seek-no-further apples than I have ever grown on a tree in the old eastern states. I took the band off every spring after the frosts had come out of the ground, because I thought it would make a harbor for breeding insects, and replaced the band along in November. The plan of protecting a young tree every winter for a number of years, or perhaps as long as it is valuable for producing fruit, I believe is a good one, and I do not believe there is a cheaper protection than these boxes and filling them with dry earth. I do not mean dust, but dirt. If we would give our trees any kind of protection to keep them healthy the first ten years, it is my opinion that we could raise a great deal more fruit than we do at the present time.

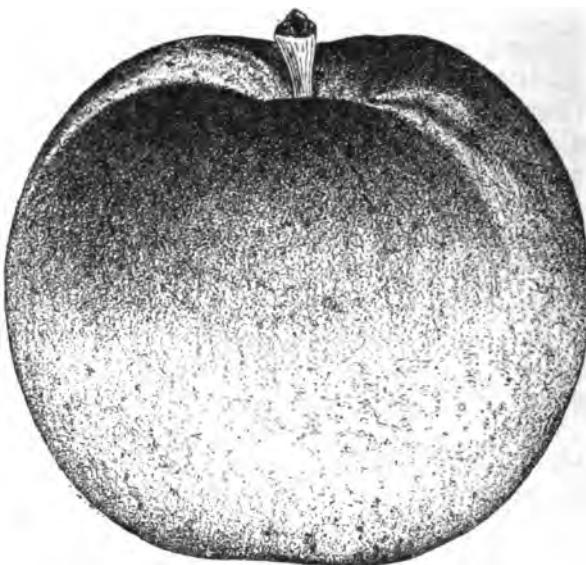
Geo. J. Kellogg: I do not wish to occupy much time, but I do believe in this protection. I do not believe in tarred paper,

but I believe common brown building paper is a good thing. The tarred paper, or anything that is black, will draw the heat more. I believe we need this protection in winter as well as in summer. Now you keep that shade on during June, July and August and it will not only protect from the sun's rays, but also from borers. I do not like Mr. Pearce's idea of getting along without a trunk, and I believe the body should be protected to the limbs. I believe a simple protection is the cheapest, and I think common brown building paper is as cheap and effective as anything else. I do not believe it is necessary to put up any boards, but if it is, I believe sawdust filling would be better than dirt, but I believe in protection for winter and summer.

E. H. S. Dartt: I think the nearer we can come to protecting the way nature protects the better. At the tree station at Owatonna I have placed six inch boards on the south side of about one hundred and fifty young trees. I have set out trees of each variety in one row all of which are protected by boards, and those in the other row are not. After a while we shall know the difference between that kind of protection and none at all. I have given some thought to boxing trees, and it seems to me if the boxes are taken away in the spring the bark would be more tender than it would be if it had not been put on at all, and that those trees would be more liable to sun scald than if left off altogether. Undoubtedly if trees are so tender that they will not stand the climate, a covering of earth will save them just as much as it will save your raspberries and blackberries you lay down and cover. There seems to be a doubt in my mind if this box and dirt plan is the best way of protecting. I rather doubt it. I have fully as much faith in the board as in the dirt.

M. Pearce: Now I believe I am a little more particular about trees than anything else. Now the bark on the south side is thicker than it is on the north side, and it is different on the east side from on the west. A tree that grows in the shade is different from one that grows in the sun, and when you put it out it is going to sun scald.

THE CATHARINE.
BY O. F. BRAND, FARIBAULT.



This is the oldest and largest seedling apple tree in the Northwest. The seed from which it grew was brought from Canada, in the fall of 1854, by Jacob Klein, of the town of Union, Houston county, Minn. The orchard where the seed was procured were all seedlings, and at that time there were trees there that had borne 80 bushels each. The Catharine is growing six miles south of the Root river and ten miles west of the Mississippi, at Brownsville, Minn. It is on an eastern and southeastern exposure. The elevation is about 450 feet above the valleys and 1,150 feet above the sea. It was transplanted when about five or six years old. The soil is a heavy clay among the native timber, being white and black oak and shellbark hickory.

The spread of the top is 30 feet. One foot from the ground the Catharine is 50 inches in circumference, and the smallest measurement of the trunk is 44 inches. It is four feet to the forks, where it branches into three limbs which measure 21, 29 and 33 inches in circumference, the largest limb, eleven inches in diameter, is on the south side of the tree. The tree leans a little toward the northeast, still there are no evidences of sun scald upon it. There is no other tree within 40 feet of it. Mr. J. S. Harris says he thinks he has seen 30 bushels of fruit on it at one time. Sixteen limbs from one to one and one-half inch in diameter have been cut from the tree in the last three years, and the wounds are healing over well. It has been propagated but little, and is now growing in Houston, Rice and McLeod counties. Mrs. Klein saved a large lot of seeds from the Catharine last fall, and sent to Mr. O. F. Brand of Faribault. An effort will be made to see if this seedling from a seedling will transmit its hardy constitution to its progeny.

THE PEERLESS.

BY O. F. BRAND, FARIBAULT.



Originated in Richland, Rice county, Minnesota. The seed from which it grew was planted in the fall of 1867 or spring of 1868, by Mr. J. G. Miller. The seed was from Duchess apples grown by Mr. George Dorrance, who planted 900 apple trees in 1857. There were only six Duchess of Oldenburg among the 900 trees. Mr. Dorrance and Mr. Miller had both noticed that the Duchess bore the most and seemed to be the hardiest. Near to them were some Tolman Sweet, which were in bearing in 1867. The Peerless is undoubtedly a cross between Duchess and Tolman Sweet. The Peerless began to bear in 1875, and has produced more bushels of fruit than any other apple or crab tree in that part of the state. It bore three bushels in 1878, and kept increasing its crop till it amounted to nine bushels in 1884, and eleven bushels in 1886. Mr. Harris, the special agent for the government, who visited the old tree in September, 1890, reported it as in fine condition, bearing about eight bushels of very fine fruit after having been cut severely for scions the four preceding years. Of the quality of the fruit he said of it, in January, 1891, "It is really a better apple than the Wealthy."

The season of 1890 being a very bad one for blight, the Peerless escaped without being touched by it. Mr. Peterson, of Waconia, had about 400 trees of the Peerless growing on his grounds. He reported it the most free from blight of anything he had ever had out of more than 200 varieties which he had tried in the past thirty-five years.

The old tree is on black sandy loam on clay subsoil. The first scions were cut from it in 1886, by Mr. O. F. Brand, of Faribault.

REPORT ON MR. A. G. TUTTLE'S RUSSIAN ORCHARD AT BARABOO, WIS.

BY J. S. HARRIS, LA CRESCENT.*

I visited the orchards of Mr. Tuttle at Baraboo, Wis., on November 28th, last, by direction of H. E. VanDeMan, pomologist of the department of agriculture at Washington, for the purpose of ascertaining the hardness and condition of the trees, value of the fruit keeping qualities, etc. Mr. Tuttle has been conducting experiments with the newer Russians for something over twenty years, and is, as far as I know, the first nurseryman in the country that ever received scions in any great number of varieties direct from Russia, he having received them through Cassius M. Clay, when representing our government at St. Petersburgh. This was the third visit I had made there. The first visit was made in 1884, in February, in company with A. W. Sias, of Rochester. At that time we found the Russian orchard containing about two hundred trees, two of a variety. The trees of the greater proportion of the varieties were looking well, and an examination of the wood showed them to be in fine condition. At that time Mr. Tuttle had a large orchard of the leading reputed hardy American varieties that had been many years in bearing, and a few varieties were apparently sufficiently hardy for profitable culture, such as Tolman Sweet, Fameuse, Walbridge and others. He had another orchard planted entirely with Duchess of about the same age as the Russians, that seemed to be in perfect condition. The next February after the winter of 1884-5, which wrought such destruction to the trees throughout the entire Northwest, I had an opportunity to examine the wood of over thirty of the varieties, in sections an inch or more in diameter, along with the Duchess and Wealthy, and found all of them showing less discoloration than the Wealthy, and twenty-five of them less than the Duchess, and some twenty of them showed no discoloration whatever.

In the summer of 1888, I paid his place another visit, and found about sixty varieties in the Russian orchard bearing fruit, and although blight was prevailing about Baraboo to an unusual extent, these trees showed less blight, with few exceptions, than the Duchess, Tetofsky or American varieties, and quite a number of trees showed entire freedom from it. At this time the Duchess orchard appeared to be all right, except showing some spur blight, but the old orchard of Americans was in a very bad condition, and several varieties past recovery.

At this last visit we find the Russian orchard still containing over sixty varieties of bearing trees and at least thirty of them are undoubtedly as hardy as the Duchess, and none of them less so than the Wealthy, and the orchard is in really better condition than any other orchard that I have found in the Northwest. It is even in better condition than his Duchess orchard on the same farm, for in that we found a number of trees that had been quite seriously injured by blight and sun scald, while but little is left of the old orchard of American varieties. After a careful scrutiny of the trees, I would name following varieties as appearing in hardiness of the tree and fruitfulness the most promising, viz: Hibernal, Grass Green, Repka, Romenska, Zuzoff, Longfield, Juicy White, Borsdorf, Gettman, Charlamoff, Beautiful Arcade, Red Wine, Red Queen, Charlenthaler,

Enormous, Anisette, Cross, Russian Green, Skrout German, Antonovka, Red Anis, Early Champagne. The Repka and Red Queen are the longest keepers. Longfield and Antonovka, Zuzoff, Cross, Gettman, and Romenska, all keep well into winter. Some of these varieties bear a striking resemblance to the Duchess in tree and fruit, but are a little better keepers and milder in flavor. The Longfield has not been considered as among the hardiest, but is now universally doing well and becoming popular, on account of fruitfulness and quality of the fruit.

QUESTION BOX.

(1) "Is it of any advantage to trim the blighted twigs from apple trees? If so, when should it be done—when the blight first appears, or after it ceases spreading?"

A member: After it ceases.

(2) "Is it true that there are more roots grown on the northeast side of an apple tree than on the southwest?"

M. Pearce: The most roots will be on the side where the most branches are.

J. T. Grimes: The most branches are where the most roots are.

M. M. Frisselle: The most roots are where the best soil is.

(3) "Is the Peter apple the same as the Wealthy?"

M. Pearce: No.

(4) "Why do some trees come out of pits in spring calloused and others not?"

J. S. Harris: It is a peculiarity of the tree itself.

(5) "Where has the Hibernal failed?"

O. F. Brand: It failed with Mr. Dartt; with everybody except a few experts.

E. H. S. Dartt: Mine was the Lieby.

(6) "Can the quince be successfully grown in Minnesota?"

Pres. Elliot: No, I do not think it can.

J. S. Harris: I would say that the quince can be grown here, the bush but not the fruit.

Prof. Green: It can be grown here, but the question is successfully. I think not.

(7) "Is it the sun or the wind that is the leading cause in setting our trees over to the northeast?"

A member: Both.

E. H. S. Dartt: I would like to say a word or two on this growing over business, or leaning over. Now a tree first branches on the northeast side. Why is it? I believe it is because the sun affects the south and west side and prevents a

full circulation of sap. That is one reason. Then again the wind blows mostly from the southwest which causes the limbs which are on the northeast side to grow out straight, whilst those on the southwest side are blown upward. Now if you will observe a tree that is exposed to the wind you will see that the limbs on the southwest side are blown up toward the body of the tree, whilst those on the northeast side grow out and grow more rapidly.

(8) "Is there any more valuable apple for Minnesota than the Duchess?"

A member: Yes, the Peerless.

A member: No, the Duchess stands at the head.

(9) Why do seedlings often prove successful, but invariably fail when an attempt is made to propagate and grow them in other places?"

Geo. J. Kellogg: There are two sides to that question. There is no reason why they should fail under any circumstances.

(10) "Is there any variety of apple not liable to sun scald?"

E. H. S. Dartt: I have never seen any apple tree not liable to sun scald. I do not believe there is any.

(11) "Does the Peerless blight?"

O. F. Brand: I have never seen any blight, and I have grown nearly fifteen thousand.

(12) "Is Longfield and Yellow Transparent as good as Plum Cider, Haas, Red Astrachan, etc? Did they not all kill in 1884?"

"Can this society approve of the course of Mr. Somerville, in recommending farmers to plant Longfield and Yellow Transparent, which have generally killed as bad as Haas, Fameuse, etc?"

"Is it a wise thing to recommend to the farmers of this state at the Institutes such worthless varieties of apples as Longfield and Yellow Transparent?"

"Are the apples recommended by Mr. Somerville before the Farmers Institutes, Longfield and Yellow Transparent, safe to be planted by farmers generally throughout this state?"

Geo. J. Kellogg: I have not much to say on the subject, only that the Longfield is very hardy with me. I raised as much as thirty to forty bushels, and they seem to be hardy. They have been bearing for the last five years, since they were three or four years old.

M. Cutler: I think this question should be answered a little more definitely. As our Institutes are held in different parts of the state, east, west, north and south, I do not think the same variety of trees can be recommended for all parts of the state.

Prof. Green: Mr. Somerville tells me he has not done that; he is very careful what he recommends.

E. H. S. Dartt: I want to say that there is no Russian apple hardy enough so it is safe for us to recommend it for general cultivation.

Pres. Elliot: What do you mean by general cultivation?

E. H. S. Dartt: I mean hardy enough to advise everybody to plant it.

J. S. Harris: The Russian apple has not yet been enough grown to recommend it.

"Are budded apples trees better for planting in Minnesota than root grafted trees?"

Prof. Green: Not so good.

GRAPES.

MY EXPERIENCE WITH GRAPE GROWING.

BY J. S. SEWALL, ST. PAUL.

In the spring of 1863 I went to live on lots in St. Paul which had been occupied by Alexander Buchanan, Esq., and I have resided there until this year.

Mr. Buchanan had planted grape vines, which I found growing, the varieties being Catawba, Clinton, and (probably) Oporto. I planted other sorts, and have had two or three hundred vines growing on the place most of the time I have lived there. The ground slopes a little to the south and west and is sheltered on the north by trees and buildings. It is high and dry.

I think nearly, or quite, all American vines are hardy if well grown at the time of planting, and covered with earth in the winter. Such as are not much later than Concords will generally ripen their fruit, if the vine is healthy. Out of twenty-eight years there have been two in which the Concords and most others have been injured by early frosts.

After the feathered and unfeathered plunderers, which we always have with us, the great enemies to be contended with are mildews, of which I have discovered four kinds. Mildews are minute parasite plants which are capable of spreading very rapidly. Each sort seems to flourish best on certain favorite varieties of the vine, spreading from them to others in their neighborhood. It becomes important to know these parasites and to discard and exterminate them. I don't believe it will pay, here, to fight mildews with sulphate of copper mixtures and other remedies.

I shall have to describe most of the mildews that have come under my notice by arbitrary names, as I am not sure of their true names.

White mould appeared first on the vines I found on the place, which I call Oporto. It attacks the green berries, which become a dirty white

color, and hard. The mould soon breaks out on the surface, looking like fine, white fur. It also attacks the young leaves and roots of some vines, and then it generally destroys the entire crop of fruit. When the mildew attacks the fruit only, removal of the diseased berries as fast as they appear, will generally stop it, so as to save the greater part.

A mildew which I call purple spot, did a great deal of mischief for several years and then totally disappeared. It came first on the Creveling grape, and its final disappearance coincided with the removal of the last Creveling vine. The spots are a quarter or three-eights of an inch in diameter, bright purple in the center, darker at the edge. The tissue under the spot is hardened and killed. The spots appear on fruit, leaves, stems and green canes, sometimes so completely covering them as to destroy the season's growth as well as the fruit. This mildew attacked, with different degrees of virulence, nearly every sort of vine I had. The only exceptions I remember being the Clinton and Concord. Some were not much hurt, others like the Crevelings, were entirely spoiled. It did not injure the health of the plants, otherwise than cutting off the injured portions might, the vines generally starting vigorously in the spring from any sound wood left.

Brown rot shrivels and kills nearly full grown berries, causing them to drop. It does not seem to be connected with any affection of the leaves or stems. On some vines it may destroy half the crop, while others of the same sort are not affected.

Peronospora appeared first six years ago, and every year since. It looks like a whitish dust on the leaves. If not checked, the leaf turns yellowish, curls up and drops. When many leaves are attacked, the fruit will not ripen, and the vine is injured, needing a season of growth nearly free from mildew before it can bear its usual crop again.

The following list of varieties includes all that I have tried enough to give any opinion about them:

Advance—Black, medium size, good and early, healthy and strong grower. Not sufficiently tried.

Agawam, or Roger's No. 15—This well known sort, in spite of some drawbacks, seems to have yielded more good grapes per vine than any other. It is slightly attacked by peronospora, and loses a great deal by brown rot.

Allen's Hybrid—White, medium size, large bunches, good and early. One vine for three years past has produced more fruit than any other white grape vine. It is slightly attacked by peronospora and white mould. Two vines of this kind, many years ago, were lost by root killing in winter.

Bacchus—Small, black grape like Clinton, but of much better quality. Very attractive to birds.

Beauty—Failure, being a weak grower and attacked by peronospora. Never perfected any fruit.

Black Eagle—Black, large berry and bunch; ripens with Concord. Yields fairly well; does not seem to have any fault.

Black Pearl—Black, medium sized berry, small bunch; the first to color, but remains sour and of poor quality; hardly worth growing.

Brant—Black, small berry, large bunch. A very weak, slow grower. Grafted on a strong Concord stalk, it produced very large bunches; early

in coloring; slow to ripen; very good when fully ripe; very attractive to birds; hardly worth growing.

Brighton—Brown grape of good size and best in quality. A good grower and bearer; severely attacked by peronospora, consequently failing oftener than succeeding.

Cambridge—Those sent me not to be distinguished from Concord.

Catawba—Too late for Minnesota.

Centennial—White, medium sized berry and bunch; rather late; does not show any fault, but not sufficiently tried.

Challenge—Brown, medium size, small branches, fair quality; attacked by white mould.

Clinton—Not good enough.

Concord—Black, large berry and bush; medium in time of ripening; medium in quality; fair bearer; little if at all injured by mildews.

Cottage—A Concord seedling; little earlier; inferior in every respect; discarded.

Creveling—Black, large berry and bunch, early and very good. This variety seems to be the favorite of the purple spot mildew, which first appeared on it, completely spoiled it, and disappeared when it was removed. Other varieties were nearly or quite as severely attacked, but have never shown the disorder since the removal of the Crevelings.

Croton—White, medium berry, large bunch, early, very good; vine fairly healthy, but weak grower. Grafted on a strong, wild stalk, it grew well and regularly produced a fair crop. It is attacked by white mould and peronospora, but not enough to hurt it much.

Delaware—Before the appearance of the peronospora the Delaware was probably the most profitable variety, yielding better crops than Concord, and not materially injured by any of the other mildews. Since the appearance of peronospora, of which it seems to be a favorite, it is worthless. In a new plantation it would, no doubt, succeed for many years.

Diana Hamburg—Grew well for a few years, but fruit was spoiled by some mildew, I forget what.

Duchess—White, small berry, medium bunch, fair quality, medium earliness, poor bearer, not attacked by mildew.

Early Victor—Black, small berry and bunch, early; good quality, small grower and poor bearer. Not mildewed.

Eldorado—White, medium berry and bunch, very early, good quality, strong grower and good bearer. Not mildewed. The most successful of recently introduced white grapes that I have tried.

Elvira—A white grape from Missouri, an enormous grower and bearer, but does not ripen well enough here.

Empire State—Did not ripen, but not sufficiently tried, good grower, not mildewed.

Etta—Too late.

Eumelan—Black, medium berry and bunch, early, good quality, badly attacked by mildew, and of late years entirely failed.

Gaertner, Roger's No. 14—Brown, large berry, medium bunch, very good quality, severely attacked by white mould.

Goethe, Roger's No. 1—Light brown, large berry, medium bunch, very good quality, good grower and bearer, rather too late. Better when not colored than unripe grapes generally are, it was first brought out for a

white grape. Slightly attacked by white mould. One grafted on a slow growing stock has ripened every year for five years, being one or two weeks earlier than the others.

Grein's Golden—White. Fruit and vine both attacked by white mould, and fruit all spoiled.

Hayes—White, good grower, not mildewed.

Jessica—White, small berry and bunch, earliest, very good, small grower and bearer. Not mildewed. It ought to be grafted on to a small stock.

Lady—White, medium berry, small bunch, very good, early, small grower and bearer. Not mildewed. This vine was planted too near strong growing old vines.

Lady Washington—White, medium berry, large bunch, very good, late, not always ripening. Not mildewed. This vine was twice injured by root killing in winter, fatally the second time.

Martha—White, a seedling of Concord, inferior to it in every respect. A poor bearer. Not mildewed.

Mason's Seedling—From Concord, white, medium berry and bunch, ripens with Concord and about the same quality. A good grower and fair bearer. Not mildewed.

Massasoit, or Roger's No. 3—Brown, large berry, medium bunch, early, good quality. It was spoiled by purple spot when that prevailed. It is injured by white mould and by peronospora, but generally perfects a good crop.

Merrimac, or Roger's No. 19—Black, very large berry, medium bunch, very good, late but generally ripens. A good grower, moderate bearer, not appreciably mildewed. The stamens seem to be imperfect, and only a small part of its flowers set fruit.

Minnesota Mammoth—A poor grower and the very large grapes uneatable. This is a wild vine of the Labrusca species, which does not grow native in Minnesota.

Mountefiore—Black, small berry and bunch, rather late, probably of good quality as the birds took them all. Not mildewed.

Moore's Early—Black, berry large, bunch small, early, fair quality, inferior to Concord. A pretty good grower but very poor bearer. Not mildewed.

Noah—White, fruit destroyed by white mould.

Norton's Virginia—Black, small berry, large bunch, late, seldom ripening, good when it does ripen. Very hardy and strong growing, and not mildewed.

Oporto—Supposed name of grape planted by Mr. Buchanan, black, medium berry, small bunch, poor quality, inferior to Clinton. Fruit and vine attacked by white mould, making it useless.

Pearl—White, said to be early. Severely attacked by white mould and peronospora, making it worthless.

Perkins—Fruit totally destroyed by white mould.

Peter Wylie—White, small berry, medium bunch, very good, ripens with Concord, good grower and fair bearer. This vine was close to spruce trees sheltering it on the north.

Pocklington—White, berry medium, bunch large, late. It never ripened enough to be eatable in three successive years. A good grower and bearer. Not mildewed.

Salem, or Rogers No. 53—Fruit was totally destroyed by white mould.

Telegraph—Black, medium berry and bunch, ripens with Concord, good quality. Bunch is very crowded and grapes apt to rot in the bunch.

Ulster Prolific—Brown, small bunch, early, poor quality, poor bearer.

Wilder, or Rogers No. 4—Black, large berry and bunch, later than Concord but ripens when not mildewed, very good. It is attacked by white mould and peronospora, and lately has generally failed.

Worden—Black, large berry and bunch, early, very good, an improved Concord. Almost destroyed by purple spot. Since the disappearance of that not mildewed. A great bearer, sometimes drops badly, but has been more profitable than Concord.

I have had Clinton, Concord, Creveling, Delaware, Martha and Rogers hybrids in considerable numbers, and for many years. The others described are mostly new, and my experience is with one or two vines of each, from one to two years of bearing.

My judgment of the best varieties for this neighborhood is brown varieties, Delaware and Brighton (where peronospora has not appeared) Agawam, Massasoit; black varieties, Concord, Worden; Black Eagle; white sorts, Eldorado, Lady. I should add Allen's hybrid, if I could depend on my own trial, but that is an old sort that has not come into general use.

DISCUSSION.

Geo. Robinson: I notice in Mr. Sewall's paper he mentions one grape, the Bacchus. I do not fully agree with him in what he says about it. I would not give it room in my vineyard. I planted twenty-five of them, and after two years I grafted Poughkeepsie Red on the roots. Very little fruit set on the vine, and the bunches were not full. As I said, I would not give it room in the vineyard. I would rather plant the wild grape of the forest than to have it there. I saw a description of it, and thought it would be very nice, but I had just twenty-five more than I wanted.

Geo. J. Kellogg: I do not want to see the Worden abused. It is a good grape; the flavor is very much better than the Concord or Moore's Early, and it is more productive.

J. W. Murray: The question I would ask is, if there is anything we can do to prevent the killing of buds.

J. S. Harris: There are several reasons why the vine becomes barren down near the roots. I presume the greatest cause is that they are not pruned back far enough, and they are tied up too early in the spring. My method is this: In every vine that stands upright the sap is inclined to go to the extreme bud first, and when I uncover my vines in the spring I tie the tip of the vine a little lower than the balance of the vine

so that the bud nearest the root will start first. There is no danger but the end vines will start up if you can get a start first near the root, and you can keep your vine even during the season, but if you tie up your vines too early in the spring in a very short time a piece of your vine is entirely bare. Tie the end down level or below.

Dr. Frisselle: I think your theory is a good one, but it does not work always. Now I have noticed this in my vineyard, especially with young vines; take a vine three years old, and you are ready to give it its first pruning, and you have a cane perhaps six feet long and as thick as your thumb. Now lay this down on a horizontal wire, and you will notice that a great many buds do not start at all. Now another point in regard to the vines starting at the far end. If you turn the vine down on a horizontal wire the best growth is at the base, because if the bud is once started there it grows right up straight. There is always a tendency to sprout close to the ground, and if not cut out it takes away a large part of the growth of the bud.

GRAPES.

BY GEO. R. ROBINSON, MINNEAPOLIS.

Mr. President and Members of the Minnesota Horticultural Society:

This is the first time I have had the pleasure of appearing before you at any of your meetings and at the invitation of your honored presiding officer I esteem it a pleasure to contribute my mite to the interest of your meeting, by relating some slight experience of recent years in the cultivation of the grape and more especially some of the recently introduced varieties.

The cultivation of the grape has attracted the attention of mankind from the earliest ages, and interest in its cultivation does not wane. In Biblical history we learn that grapes so abounded in the Holy Land that every family had a vineyard.

Solomon, said to have been the wisest of his time, had extensive vineyards which he leased to his tenants, song 8, verse 12.

David in his 104th psalm says in speaking of the power, goodness and works of God, "He causeth grass to grow for the cattle, and herbs for the service of man; and wine that maketh glad the heart of man, and oil to make his face shine and bread which strengthens man's heart." Our Savior in several instances paid the fruit of the vine the highest compliments, as at Cana of Galilee where he furnished wine to enliven a festive occasion, and lastly he rendered the product of the vine the most distinguished honor of making it the permanent and lasting memorial of his death and a symbol of man's redemption. In view of all this and of the high estimate man has always bestowed upon the fruit of the vine in the universality of its use, it is not surprising that a disciple of Blackstone and Kent should desire once in a while to be found in good company, and

to engage in so respectable and honorable a calling as the cultivation of the grape, which could engage the attention of a Solomon, and of many of you members of the Minnesota Horticultural Society who perhaps may not claim the possession of so much wisdom as Solomon had.

Many of you may think from my digression from the subject assigned to me that I shall endeavor to palm off on this meeting a treatise on some of the favorite varieties of Solomon's time as new varieties, so I shall rigidly adhere to my subject.

Always having been an ardent lover of horticultural pursuits, I some five years since determined to plant a vineyard on Lake Minnetonka as a matter of pleasure to myself, but I hoped of some profit to a relative who resides within about one mile of the hall where you held your last meeting. The resolution has been carried out and has resulted in some experience which I am quite willing to give this society the benefit of.

As is the case with all amateurs in an undertaking my efforts were, in a measure, experimental and I was desirous of planting as many new varieties as I from inquiries concluded were meritorious. As a result the members of great experience in this society will, I fear, conclude that my efforts have resulted in giving me more amusement than my relative has derived profit and I shall not deny that such has been the result, though I insist that my selections are generally such as are of general worth and value.

To the energetic co-operation of my relative, however, allow me to render the credit of making my efforts such a practical success as has been attained.

The number planted has been somewhat upward of 1,600 vines of which 600 are the reliable and universal favorite, the Delaware. Among the newer varieties I will name in the order I deem of greatest value, as by observation and further acquaintance I have distinguished their characteristics and adaptability to our rigorous climate.

First in quality of fruit, in productiveness, in hardiness of vine and freedom from disease of vine or fruit is the Poughkeepsie Red, a grape originated by A.J.Caywood, of Marlborough, New York. The fruit in appearance much resembles the Delaware from which it was produced by fertilization with the Iona. The fruit is somewhat greener in appearance when ripe than the Delaware, larger in bunch, shouldered, ripens fully one week early than the Delaware, and by most who have tasted the fruit preferred to the latter variety.

The season of '88 when the foliage of the Delaware was so badly affected by the wet, cool and rainy weather of July, resulting in what I termed blight, when the fruit of the Delaware did not ripen, the foliage of the Poughkeepsie was healthy, the fruit ripened perfectly and neither vine, fruit or foliage seemed to be in any way injuriously affected by the unfavorable conditions.

In my judgment I next place as one of the best of the new varieties the Ulster Prolific, originated by the same person last mentioned by fertilizing the Catawba with the common frost grape of the forest (*Vitis Cordifolia*). The fruit of this variety is of a perfect copper color, ripens somewhat earlier than the Concord, is hardy, healthy and an excellent accession to the list of our new grapes. The vine and foliage of this variety also proved themselves proof against the unfavorable season of 1888.

The Early Victor, a black grape, originated I understand in Kansas. I would place next in the list of new grapes meriting attention from Minnesota fruit growers on account especially of its earliness which with us in this climate must always be a recommendation for any variety of fruit offered for cultivation.

Among the white grapes of recent introduction the Golden Pocklington I would say was the best of its kind, not a prolific bearer or large bunch, but the bunches are very compact, the taste a pleasant acid, and the vine and foliage apparently healthy.

The Niagara I would say has been to some extent a disappointment. Its first years fruiting gave promise of all that was by the propagators vauntingly claimed for it, but in 1888 the fruit was specked with rot that while it did not seem to penetrate deeper than the skin of the grape of course rendered the fruit almost worthless. The fruit buds of this variety also did not prove sufficiently hardy to withstand a Minnesota winter under the same protection given to other varieties. Many of the buds both for leaves and fruit failed, having many bare spaces upon the arms, rendering the vines unsightly as well as barren.

The Jessica proved a good grape of the white variety, being a prolific bearer, healthy in vine and foliage and entirely hardy.

The Empire State also is a good grape, bearing large bunches, is hardy but not in any respect equal to the recommendations given of it by either the propagator or the nurserymen offering it for introduction.

Should it prove to be the desire of the society at any future meeting to hear from me as to the merits of the Eaton, Moyer, the Wyoming Red or any others which I have experimented with, I shall be most happy to submit a further article after a further observation of their growth and fruiting.

DISCUSSION.

Pres. Elliot: You have heard the paper. I presume Mr. Robinson would be happy to answer any questions.

J. W. Murray: Where is your place, Mr. Robinson?

Geo. Robinson: It is north of St. Albans Bay. As I stated, the place was secured for the benefit of a relative of mine, a widow, who lives on it and cares for it with such help as I hire for her, and I devote a little time myself to the culture of fruits.

J. H. Harris: Have you any Brighton grapes in that collection?

Geo. Robinson: Yes, sir. It is not doing as well as other grapes I have there. It is successful in favorable situations, but it has not been in bearing as long as the others. The vine-yard is planted on the south side of the hill.

Dr. Frisselle: Have you ever fruited the Poughkeepsie Red?

Geo: Robinson: The Poughkeepsie Red has fruited three years.

Dr. Frisselle: How does the quality of the grape compare with the Iona?

Geo. Robinson: I think the Poughkeepsie Red is the finest grape I have ever tasted.

Geo. J. Kellogg: Have you fruited the Worden and Moore's Early?

Geo. Robinson: Yes, sir. They both do quite well.

Dr. Frisselle. How about the size of the grape of the Poughkeepsie Red?

Geo. Robinson: It is larger than the Delaware. The grape is copper colored. Year before last I took some to the state fair and many supposed it to be the Delaware. I told them to taste it, and they said it was not the Delaware.

Pres. Elliot: We thank Mr. Robinson very much for this paper, and we hope he will continue his investigations and report to us from time to time, and if he will take it as an invitation now and prepare his notes during the season and give us a little more in detail anything in the way on insects, diseases, or anything that troubles his vines, we shall consider it a great favor.

M. Cutler: I wish to ask the gentleman which he considers the best early grape, the earliest of all that is a good grape.

Geo. Robinson: The earliest of all that is a good grape is the Jessica.

Prof. Green: Don't you find it a little bit tender?

Geo. Robinson: I have not found it so.

REPORT ON GRAPE INSECTS AND DISEASES.

BY J. S. HARRIS, LA CRESCENT, MINN.

Mr. President and Members of State Horticultural Society:

The grape crop of 1890 was not nearly as great as average, but in the section where my observations have extended, the shortage was not occasioned either through the depredations of insects or influence of diseases, but rather from a killing frost that occurred in May, after growth had started. I have never known fewer insects of the species that prey upon the grape vine or fruit than we had last season, and in fact the same was true of many other species of noxious insects. The cause I am unable to explain. The previous winter was not severe, and that is said to be favorable for the wintering of the eggs, larva, chrysalis and parent beetle. The extreme wet of the earlier season may have been unpropitious for the depositing or hatching of eggs. Upon my own vineyards I have not discovered any indications of mildew or any species of

rot. I do not think the rows treated the previous year with Bordeaux mixture have made as strong a growth or produced as much fruit as those not treated, but presume I was too liberal with the application of the mixture. In some instances I notice that vines most severely cut back by the frost did not thoroughly ripen the season's growth, and such may be more susceptible to disease next season in case we should have a superabundance of moisture.

TREATMENT OF FUNGUS DISEASES OF THE GRAPE VINE.

BY A. W. LATHAM, EXCELSIOR, MINN.

This article is to be a brief record of my experience with this class of grape diseases. It is necessarily brief, because the fortunate climate of our state, so dry and clear, gives comparatively little encouragement to the growth of fungi. Its depredations are mostly confined to the Delaware grape. It is mainly the work of one species, the downy mildew, or *Peronospora*. The powdery mildew, which botanists have given a heart-rending name, with which I will not torture you, is the source of a little annoyance upon the fruit of some varieties of the Rogers, notably, Nos. 4 and 15, and appears under favorable circumstances upon the unopened blossoms of the Cottage, Pocklington and occasionally other sorts. It is easily destroyed by an application of flour of sulphur dusted on the attacked parts as soon as detected. If looked for closely and treated at its first appearance no serious harm will follow. Possibly a second application may be needed later. With the downy mildew it is quite another thing. When it appears upon the leaves of the vines, the mischief is already done and it is too late to apply a successful remedy for that year. This disease must be fought before hand, the vineyard must be fortified against it, and it must not be allowed to get even a foothold. Without waiting to see whether the weather of that particular season is to be favorable or unfavorable to the growth of this parasite, the grower must act on the principle that it will appear at its regular time, and do his work accordingly. The vine-growers of this country are certainly under great obligation to the department of agriculture for the intelligent, persistent and successful investigations it is conducting into the cause and cure of grape diseases, especially grape rot and downy mildew. Experiments being made in many parts of the country, furnish ground for belief that a successful remedy for these diseases has been found. The treatment consists of liquid applications of compounds, after several formulas, the active principle in all of which is sulphate of copper, and the applications are to be made as a preventative, beginning before the buds push in the spring and being repeated at intervals of about two weeks till the fruit is nearly full size. The more faithful the treatment the better the result.

The formula which appears at this stage of the investigation to meet with most favor is called the ammoniacal copper carbonate. It is composed of copper carbonate, 3 oz.; strong ammonia, 1 qt.; water, 22 qts.

My own experiments have been upon a limited scale and confined to a block of 250 Delaware vines in the vineyard attached to my residence in Excelsior. These vines have been in bearing some twelve years, and with the exception of a few years while young have always suffered more or less from the downy mildew. In two or three seasons the attack has been

severe, appearing on the under side of the younger leaves in white patches which soon pushed their roots into the body of the leaf, turning it yellow and destroying its vitality. This was accompanied by the curling up of the edges of the riper leaves, then gradually drying and falling off, till so few leaves were left that the fruit could not ripen in a natural manner and lacked its usual sweetness and flavor. In moist seasons the attack has been less severe than just described and has been confined to the drying and falling of some of the older leaves, always doing, however, some damage to the quality of the fruit.

My first experiments were made in 1889 by application mostly of the Bordeaux mixture, a preparation similar to the previously described formula, but containing lime in place of ammonia. The mildew had already appeared in a mild form when the mixture was sprinkled on the vines, being then early in July, and no beneficial results followed. It was too late for its use as a preventative.

Last summer I made further applications on the same vines, the first early in June and a second a few weeks later. The formula used then was that of the ammoniacal copper carbonate. The applications were made in an awkward and inefficient manner by the use of a common garden pump and nozzle.

Late in April I sent an order for a Eureka Sprayer, intending to give thorough treatment in all my vineyards, but could not get one and was obliged to place my order then for one to be delivered another year. The manufacturers must be having a boom, as it hasn't come yet. However results of this half treatment were most satisfactory and more than met my hopes. There was no mildew on these vines till the fruit was coloring and within two or three weeks of gathering and then only a little and not to do any injury to the fruit. This exemption was not because it was a bad season for mildew, because there was the usual amount in other vineyards in the neighborhood and I felt that it could be fairly ascribed to the applications made. Another season I intend to make thorough applications, beginning early and repeating them often, not only to my Delawares but to all the varieties in my vineyards. With a suitable apparatus the cost of making them is very small and not to be compared to the benefits that seem likely to follow. The standing of our grapes has been very seriously injured in the local market by the ravages of this pest and vine growers fully realize the necessity of annihilating it.

REPORT ON HORTICULTURAL APPLIANCES AND MARKETING.

By M. CUTLER, SUMTER, MINN.

Mr. President, Ladies and Gentlemen:

The marketing of horticultural products I consider of the greatest importance to the commercial grower. The farmer of Minnesota generally has a good market at home for all the small fruits and garden vegetables he will grow, but he who has fruits and vegetables by the acre must look elsewhere for a market. To market successfully we must have produce of high quality; for fruit and vegetables well grown are more than half sold. Fruit must be of large size, good shape and color, ripe and free from dirt, leaves and sticks. If you have dirty berries, wash and use them at home, or

thow them away, but never ship them. I have had a little experience in this line, and know whereof I speak. Have nice, clean packages of the most popular market styles in readiness at the beginning of harvest; neglect of this precaution often causes great loss.

Have good pickers engaged, and see that their work is properly performed.

If you are so situated that you can do it, and like to do it, you can retail your own berries, but I prefer to make arrangements with merchants and hotel and restaurant keepers, and sell by the case or package, and believe I obtain as much with far less trouble by so doing.

If harvesting is delayed at any time by rains or otherwise, so that you have more than your regular customers will take, ship the surplus to a commission house, and get what you can. While there are honorable commission men in our big cities, the experience of most country shippers is not favorable, and each year we are learning how to get along without their services.

By keeping the mulching on part of your strawberry bed you will have a longer time to harvest, and get more for your crop, as late Minnesota berries have no competition from the south, and generally bring a good price.

The same general principles apply to the marketing of vegetables as to fruit. He who has them of good size and quality, and put up in an attractive shape, generally obtains the highest price. A little style, or some mark on packages or bunches will often attract a customer, and be the means of making a sale.

A young lady dressed and shipped some fowls to a Chicago firm, receiving eight cents per pound for them. The next lot shipped she dressed in fancy style. Bits of blue ribbon were tied on the legs and wings and neck; each bird was wrapped in clean paper, and the boxes lined with the same. This lot netted her thirteen cents per pound, with a request for more of the same style. From this we can learn an important lesson. Our most successful horticulturists are those who by experience have learned to pander to the popular taste.

HORTICULTURAL APPLIANCES.

The most important appliance is a mind and brain filled with enthusiasm for the work. A person who considers the work of the horticulturist as small business should not choose it as an avocation.

Good fertilizers containing an abundance of potash for berries, and an abundance of well-rotted stable manure for vegetables, are required on most soils.

The best plants and seeds obtainable, cost and quality considered, should be selected. Hotbeds are a necessity to the market gardener, and I consider them so to the farmer who delights to have early vegetables for home use.

Good tools are required to prepare the soil for the reception of seeds and plants, and cultivate them while growing.

A plow that will scour in all soils; a harrow with fine teeth, to thoroughly pulverize the soil, is required, also a cultivator that is readily adjusted to rows of different widths, with small steel shovels that will not work the land into ridges; a good seed sower, with best quality spades, shovels and hoes, constitute about all the tools needed.

Insecticides are needed for vines and bushes; London purple or Paris green for potatoes, and white hellebore for currant and gooseberry bushes are good. I find white lime good for squashes and melons.

If you are growing raspberries and blackberries where high winds prevail, you will need some number 12 wire and stakes. If you are cultivating vegetables it will pay to have plenty of baskets and boxes on hand; for grapes nice ten-pound baskets; for strawberries and blackberries quart boxes in sixteen or twenty-four quart cases; for raspberries pint boxes in twenty-four pint cases.

If you have a large quantity of produce of high quality to market, it will pay to have a stencil plate and mark each package with your name and address. According to friend Somerville, the most useful and necessary horticultural appliance is the pig, which he uses both as a cultivator and insect destroyer in his orchard. Friend Allen, of vegetable fame, also finds him very useful as an aid in composting the large amount of fertilizers he needs.

In conclusion, kind friends, I wish to say that I don't know what was expected of me when I was placed on this committee. I don't know much about horticultural marketing and appliances as practiced and used by our city friends, like Mendenhal, Nagel, Busch, and many others.

I don't know why so many of our citizens prefer filthy tobacco and brain destroying whiskey to nice fruit. I don't know why the industrious, sturdy, country-grown boy is not as well qualified for any position of trust as he whose residence happens to be in the city.

SMALL FRUITS.

REPORT ON SMALL FRUIT, 1890.

BY DEWAIN COOK, WINDOM, COTTONWOOD COUNTY.

Strawberries were a very light crop, as plants wintered very poorly even where well mulched in the fall. Late frost took some, and continued damp and hot weather at fruiting season caused some fruit to rot. We only got three fair pickings. Varieties preferred, Crescent and Downer's Prolific.

The dwarf Juneberry seems entirely hardy; yields immensely of bluish black berries, about the size of tame black currants; ripens with late strawberries; quality not quite equal to the blueberry. I did not miss any taken by birds except a few of the latest.

Currants a fair crop. Red Dutch mostly grown. They sold readily at ten cents per quart, and were used mostly for canning with raspberries.

Gooseberries a good crop, selling slowly at eight cents per quart.

Of raspberries I am testing some twenty varieties. The crop the past season was from light to fair, the reds taking the lead for profit. The Turner takes the lead in hardiness and quality and is the popular variety for farmers; but with me the Marlborough has superceded it for market,

it being much larger and finer looking, being of the same season or a little earlier. It is much easier gathered, a much firmer berry and cane; nearly as hardy and I think more productive, but like most of our raspberries requires rich soil and good cultivation. The Superb is another superb red raspberry, of immense size, firm, and of bright red color; cane a strong grower, and ranks about with the Turner for hardiness. The Brandywine is my standard late red raspberry. The Cuthbert has not done very well; many of the fruit stems dry up just before the fruit ripens. We think it is caused by some insect.

Of black caps the Souhegan ranks first. It is early or medium early, and a strong grower, but lacks hardiness. The Ohio is the most reliable black cap with me. It outranks them all in hardiness, but is rather a slow grower while young. The Gregg is fine for late, but like the Souhegan it needs an extra covering for winter.

Of blackberries, I am testing fifteen or more varieties, but they have all done so poorly the past three seasons that I have voted them unprofitable. To the dry atmosphere that usually prevails here at the time the berries should ripen, may be laid the failure of the blackberry and the dewberry.

Grapes have done very well, the Concord taking the lead as to hardiness and productiveness, but on our heavy soil it does not ripen well in ordinary seasons. Of black grapes I prefer the Champion, Moore's Early and Wordon. Of these the Moore's Early is hardest. Of red grapes I like the Delaware and Brighton, and of white grapes the Martha gives good satisfaction.

The present winter up to date, Jan. 10th, has been very mild, with little or no snow on the ground. With us an open winter means a poor, small fruit crop the coming season, as winter protection of canes in many cases is needed, and so is root protection necessary. A good fall of snow in early winter furnishes the latter, and oftener the former. I will now close, hoping for an immediate and heavy fall of snow, and that we may be blest with "The Horn of Plenty" (of small fruit) the coming season.

DISCUSSION.

Geo. J. Kellogg: There was one point in regard to covering with hay and mice getting in and doing damage. There is no use in using marsh harsh hay on anything that mice will eat. It is unsafe to cover anything with it if there are mice within eighty rods.

President Elliot: One dollar's worth of strychnine, rightly handled will protect all the strawberries that one man will raise.

Geo. J. Kellogg: How would you apply it?

President Elliot: If you will just make some little clumps that are thicker than the other covering and put your strychnine in there, it will catch every mouse on the place. If

you have crystal strychnine, which is the best, put it on a plate and pulverize it and put some meal with it, stirring it up; use just a little strychnine, just what you can take on the point of a penknife, and fix a half dozen places.

C. L. Smith: If you mix a little grease with your meal it will do better.

SMALL FRUIT.

BY MISS ANNIE BONNIWELL, HUTCHINSON.

Mr. President, Ladies and Gentlemen:

I am requested to prepare a paper on any subject I thought best. I know not what would be of more interest than on the different kinds and amount of fruit grown by me last season. In regard to strawberries, on less than one-tenth of an acre I picked two hundred and fifty quarts. They included the Glendale, Crescents, Bubach and Windsor Chief. On one bed of about a quarter of an acre I picked but very few quarts. They were Park's Beauty, Belmont and Jessa. Park's Beauty grows remarkably strong and healthy. They produce an immense number of runners and but very little fruit. I have a large bed of Captain Jack and Fenche's Prolific, from which I gathered about twenty-five quarts. The quality was not of the best, probably owing to the unusually wet weather which prevailed at the time of ripening. My raspberries did remarkably well. On less than one eighth of an acre I picked five hundred quarts. I think the best varieties of red raspberries for the general cultivation of our locality are the Turner, Brandywine and Philadelphia. I would place the Turner at the head of the list of these berries. It is a medium, round, bright, red berry, early variety, of excellent quality, strong grower, hardy and productive. The Brandywine is very productive, grows in large clusters, but is a little too soft for shipping. It is very hardy. The Philadelphia is a very large, bright berry, but not very productive. In regard to my black caps, I had about half an acre, but they were winter-killed. They included the Tyler and Doolittle. I also have three different kinds of currants, Red Dutch, Black and White. I have two kinds of gooseberries; one is Houghton; the other is a wild berry which I got from the woods, planted and cultivated. It is very productive. The berry is larger than any other. In regard to grapes, I have several vines, but the Concord and Worden do the best.

SMALL FRUIT GROWING IN OTTER TAIL COUNTY.

BY F. H. FIEDLER, FERGUS FALLS.

Mr. President and Members of the Minnesota State Horticultural Society:

I was requested by your secretary to write an article on small fruit growing in Otter Tail county for the annual meeting of the society.

Now, I am more used to the grub hoe or the spade than to pen and pencil, but if you think it is worth your time to listen to an Otter Tail county backwoods bachelor, I will try and give you a few homely remarks on my successes and failures in small fruit growing.

I was formerly living at Perham, this county, but as the soil around there did not satisfy my wants, it being too shallow, on gravel subsoil, I came here to Fergus Falls this spring, where I can have more selection of soil and location than on a sandy prairie. I am here on timberland with clay subsoil, covered with eight to ten inches of black soil.

I will begin with the strawberry.

I need not relate what a luxurious berry this is, for you all know that, but I will state my success with it. Most varieties of strawberries do best on deep rich light soil, which is naturally moist (not wet.)

In selecting a piece of ground for strawberries, care must be taken to have it nearly level, as any considerable slope will cause the heavy rains to wash the ground over the plants, covering up some and washing out others.

My experience has been that it is next to impossible to manure strawberries too much, especially the Wilson.

I have not decided yet which time is best to plant, in the spring or in summer, but for the inexperienced planter the former time is always the safest, as plants planted in the early spring days will always root better, whereas when planted in hot days of July and August when the weather is often very dry the leaves wilt and dry up before the plant has time to catch roots, thereby causing great delay if not actual damage.

I have tried many ways of planting in summer, but I like the following the best :

I dig the plants to be transplanted in the morning, shut them in boxes $\frac{1}{4}$ by $\frac{2}{3}$ feet wide and 1 foot deep, and set away in some cool, moist, shady spot, watering often.

I start planting them in the afternoon of the second day after digging up.

By being kept wet and cool the plant will by this time have thrown out many little white roots, and if handled with care will grow very quickly. In planting, if I can, I select a time when the moon shines brightly and plant from four o'clock in the afternoon until eleven at night. By this method I get my plants started before the leaves wilt, and consequently lose very few plants. I planted 8,000 this summer, and I do not think I lost twenty-five. There may be other ways of planting much better than mine, but this is the way I'll do it until I find a better way.

Mulching is indispensable here in winter. Last fall I read an article in the "Farm, Stock and Home," where a man mulched part of his bed and left some of it unmulched, and the part not mulched came out best, so I tried the plan too on a small scale, and I learned it was not a complete failure, for when spring came I had on an average two plants to the square rod still growing.

I have only fruited the Wilson and Crescent, except the last two years, and it was so intensely dry the past seasons I cannot say much about the other varieties.

I planted last spring, side by side, one row each of Wilson, Countess, Bubach No. 5, Princess, Jessie, Sharpless and Green Prolific. They grew nicely until the dry weather set in. I wanted to see which could stand the most drought and did not mulch them. They were cultivated often. July 15th there were growing Jessie, 66 per cent; Wilson, 15 per cent; Bubach No. 5, 1 per cent; Green Prolific, 1 per cent. The Jessie looked heal-

thy and vigorous, more so than the rest, and was the only one that made runners.

This was at Perham, here at Fergus Falls we had more rain, and what plants I took with me, when I came here this spring, have grown very well.

RASPBERRIES.

I have had more success with the raspberry than any other fruit except the currant. I grow them on rather dry land; but the past season was too dry for them, and most of them did not bear much. All raspberries must be covered in winter here in Otter Tail county. I often hear of hardy and tender varieties. Here all are tender, and I can grow the most tender sorts better, with protection, than the most so-called hardy, without it. Rotten wood makes the best manure for raspberries.

Of the red, I grow Cuthbert, Turner and Philadelphia. I like the Cuthbert the best for market; and the Philadelphia for home use. Of the black caps, the Gregg does best with me.

The Caroline is a good yellow variety. It stands dry weather better than any other on the list. It was the only variety that got its crop all ripened the past season without the berries drying up. The Golden Cap seems to do well but I have not had it long enough to say anything about its good or bad points.

BLACKBERRIES.

Somehow I have never made any progress in blackberry culture. I think the soil at Perham is too dry for the blackberry, too much sand I suppose.

I have tried the Snyder and Ancient Briton. I also received from the state experiment station, St. Anthony Park, some Stone's Hardy, but have only two left. I think I uncovered them too early last spring. They looked well when uncovered, but only two grew.

I have also some fifteen plants of the Lucretia Dewberry, which I have had growing now for three years. They stand the winter well, if covered up with six inches of ground; but I have not seen one berry on all of them yet. I have often read they want poor soil. Now, if that at Perham is not poor enough, I think I had better give them up as a failure. Well, I will give them another trial.

CURRENTS.

Of currants I grow, or have grown at some time, the Cherry, Fays Seedling, White Grape, Victoria, La Versailles, Red and White Dutch, and Lee's Prolific.

I think the Cherry and Victoria are the best of the red varieties. The Fays Seedling has very large berries, but not enough of them. The White Grape I would take for the white, or yellow varieties. The Lee's Prolific is good for jelly, or preserving, only. It cannot be used on the table fresh, like other currants, on account of an unpleasant taste, peculiar to some of the native currants.

All the currants, except the Lee's Prolific, are perfectly hardy here. The Lee's sometimes kills back some 6 or 8 inches, and should be protected in winter.

GOOSEBERRIES.

My experience with gooseberries is limited. I planted the Cluster, Downing and Houghton. I only fruited the Cluster. All gooseberries need protection here.

GRAPES.

So far, I have not had any success in grape growing. One year the grasshoppers trimmed them for me. They started to grow again and an early frost killed the yet unripe wood to the ground. Next spring they were backward in growing, and again the wood was killed in the fall, and so on, until this spring, when only some 15 grew of 800; 13 varieties in all. Here, where I am now, I have a fine location for grapes, and I will try them again as soon as I have money enough in my pocket. Mr. E. Munz, of Elizabeth, some four miles from here, received some grape vines from the state experiment station, St. Anthony Park, some three or four years ago, which he planted in a wheat field, where they are still growing. He never worked them any, only covered them in winter, and tied them to stakes in spring. They were never pruned. Last fall I saw them; the weeds were taller than the stakes, but several varieties bore a remarkable crop for the condition they were in.

They were the first Otter Tail county grapes I ever saw or tasted, and I think in a favorable location and under thorough cultivation, the earlier varieties can be grown here with success.

CHERRIES.

All the cherries went over the garden wall to the trash pile except two Osheim; and for all I know, they too, may soon follow the rest. As yet they are looking tip-top, but who can tell what they will be in three or four years?

Let me call your attention to the native sand cherry. I think this shrub should receive more notice by our horticulturalists than it does. I have had quite an experience in raising them from seed; and I know that the offspring of the same plant is very variable. Seedlings from the same plant will not bear the same kind of fruit. Some will be of good flavor, sweet and juicy; some will be hard and bitter; some will be globular in shape, and some oval. In some the pit is larger, in some smaller; and some grow more upright than others; and I think if plants from different localities and soils were planted together we might be able to originate a variety of cherries that would supply our wants. Working on this line I intended to get some plants of a yellow variety from South Dakota, but I was so busy at the planting time this fall that I forgot to send for them.

PLUMS.

I have only one variety of native plums, except what I dug up in the woods. I do not know the name of it. It seems to do well here. I have had two crops off them. The fruit is large, and of better quality than any I know of around here. Color, yellow, with a few red marks on one side. It ripens rather late for this section, and I am afraid it will be often frosted before it comes to maturity.

I think it is not necessary to state that other plums, or prunes, than the native, will not stand the winter here. I presume most of you knew that long before I did.

Well, ladies and gentlemen, this is about all I know of small fruit growing; and I think, with good care, and judgment, anybody can grow most, if not all, the hardier varieties of small fruits, here in any locality. The reason why not more efforts are made here, to grow fruits, is; first, to much post-auger-fence-corner planting; second, the weeds grow too high in

a short time, and third, poor selection of plants to be planted. Only a few months ago, an agent of a nurseryman (I do not find his name in the last year's report as a nurseryman who is a member of this society) came around here with a large book of colored plates of mammoth, small and large fruit, among them the Yellow Transparent apple, not much inferior in size to a Hubbard squash, etc., not to say anything of the numerous monstrosities preserved in alcohol. He sold his rarities for just a trifle more than nothing; gooseberries and currants for only a dollar each. Cuthbert raspberries at 25 cents a root, etc.

I heard of many farmers around here who bought strawberry plants at \$2.50 a hundred, and in every case I know of, it was the Crescent seedling. Next spring the happy owners of those plants will plant them and some of them will, perhaps, cultivate them too, but in every case everyone will expect them to yield an immense crop. Not one has a stamine variety to fertilize them, and no doubt, in two or three years there will be many a man more in this county who believes that strawberries cannot successfully be cultivated here. If people would believe that small fruits could be grown here they would grow them; but after having been unsuccessful so many times it is hard to convince them of the truth.

I do not intend to say much about apples. I have some Russians that stood four winters, the rest of them are all on the brush pile. In closing I would say that if you should ever intend to establish an experiment station here I would be glad to hold the lines.

DISCUSSION.

M. Cutler: My idea is that our friend's taste is somewhat vitiated when he considers the Philadelphia the best raspberry for home use. I obtained my first crop of Philadelphia last season, and I have a very poor opinion of it, as a home berry anyway, and as a market berry. In the first place, as a market berry it is not the proper size and color, and the quality I consider very inferior. The Turner, I think is, by all odds, the best berry we have.

M. Pearce: I want to say one word in regard to the Caroline. He speaks of the Caroline as being very hardy and productive. I have grown the Caroline ten or twelve years. It will endure more cold and more drouth, and produce more fruit with the least care than any berry I ever grew. It is a yellow berry, very large, and one of the finest table berries I ever owned.

M. Cutler: Another point I wish to raise: I should like to hear some discussion on raising strawberries. Our friend says that the Wilson can be manured to the greatest extent. I have some Wilson strawberries and set them on rich land, and I have very poor success with them. They did not produce

anything, so I plowed them up. The Crescent were by the side of them and yielded ten times the fruit, and I believe the Wilson berry can be too highly manured. Whether this is the main cause of failure, I do not know.

C. L. Smith: About the manuring of the Wilson berry, it makes a great deal of difference what kind of soil it is. Mr. Cutler has a very loose, light soil that does not pack, and come to manure it, it would not be firm enough to hold the roots and would be affected by drouth. As to the Philadelphia raspberry, Brother Cutler does not like it on account of its flavor, but I would say that it is a difference of taste. I know a great many people that naturally like the flavor of the Philadelphia raspberry, and so far as size is concerned, if the ground is kept moist, and if on clay soil, they will be larger in size, and a great many people prefer them to other varieties.

R. P. Lupton: I would like to say one word in regard to planting strawberries. The 20th of last August I set out a lot of strawberries. I first had made two hundred tubes of tin, five inches long and three inches in diameter. I placed one of these tubes over each plant and pressed it down three-fourths of the way. I placed as many of these tubes as I could handle, filled with dirt and the plant, into a wagon and hauled them to where I wanted to plant them. I had my ground nice and mellow, and set the tubes with the plant right into the ground and filled the tube full of water.

M. Cutler: What was the price of those tubes?

R. P. Lupton: Two cents a piece.

Pres. Elliott: Mr. Lupton, will you write a little paper stating your plan and giving a cut of the tubes?

Anything further on this subject?

M. Cutler: I would like to ask the experience of market gardeners and strawberry growers in regard to the Bubach; whether they have been successful in growing it.

Pres. Elliott: Is there anyone in Minnesota who has been successful with the Bubach? I would like to call upon Mr. Kellogg, of Janesville, Wis.

Geo. J. Kellogg: I am glad to meet with you. I was listening with a great deal of interest to these papers and discussions, and as "strawberries" is the subject of my paper the question raised may come up later. The Bubach is the most successful large pistillate variety grown, and it has given general satisfaction in our country. It is the finest pistillate variety for home use and near market. I do not think you can

plant too many of them. Its size sells it, whether anyone knows anything about it or not. In color it is a little light, but it will bring two or three cents better than other berries.

STRAWBERRIES.

BY GEO. J. KELLOGG, JANESVILLE, WIS.

Mr. President, Ladies and Gentlemen:

This subject has been so often written up in your past volumes that it seems almost useless to take a moment of your valuable time on this question, and but for the farmers and amateurs who are anxious to get hold of your transactions, I would only touch the comparative merits of new varieties that clamor for a place upon our lists. The best part of any paper before a convention of horticulturists are its weak points, thereby provoking discussion, and I shall therefore try and make this paper valuable in that direction.

Location of the bed, field or plantation is of the first importance, if it can be beside a large body of water or upon high ground, where the morning breeze will protect from late spring frosts. It may be the turning point of success or failure, but everyone having a garden should raise his or her own strawberries.

Guard against water standing on the ground any length of time, therefore protect by surface drainage.

Soil. Any soil the sun ever shone upon will grow strawberries; perhaps the best is a rich sandy loam, underlaid with a yellowish clayey loam, being easy of cultivation and retention of moisture; underdraining will doubtless pay on very much of our best land. Do not plant on virgin soil direct from the prairie sod or the forest, such soils need five years cultivation before planting to strawberries, always grow some hoed crop on the ground two years previous to planting to avoid the white grub. Forest soil has too much leaf mould, making it too light, prairie sod is too dry.

Preparation of the soil should begin two years previous to planting, by heavy applications of manure fresh from the stables that has not been exposed to the flights of the May beetle in May or June. Composts and old, well rotted manures may do for old beds, but do not apply anything that is liable to have the egg or larva of the white grub to new beds; prepare the ground as thoroughly as you should for an onion bed.

Planting. Were I setting five acres annually, as much as I hate tobacco, I would use a tobacco planter. In smaller plantations set with spade or dibble on a line mark or use a horse marker. If a line is used, stretch it and walk back on the line and the marks will be plain enough to follow and no line in the way. Rapid work can be made by using a long-handled dibble, as for setting poles; but the most satisfactory work is with a spade and the planter following on his knees. As we cannot always have just the weather we would like, have the dry dirt kept out of the holes and the plants fresh dug kept in dirt or water.

Varieties. We have plenty of pistillates that are very satisfactory, and I would give hundreds of dollars to know which are the two most profit-

ble pollen producing varieties now in the market for my own soil for early and for late.

Wilson is getting feeble in its old age, in many locations, by lack of care and culture, and with rust and disease; it is almost a failure.

Sharpless is very uncertain and almost worthless; Cumberland is too soft, except for home use and near market; Chas. Downing is the same and badly addicted to rust; Capt. Jack (late) is one of the best old varieties when it does not rust; Piper may be retained for pollen, but the fruit is small; Vick is about in the same fix with perhaps more rust; Mt. Vernon is one of the best late berries; Gandy is claimed by many as the best late variety, not as productive as we want for a late berry; Jessie, while quite sensitive to cold nights and northeast winds while in bloom, is the best large berry of years standing we have ever planted that is perfect in the blossom.

Countess, we thought, when we met it years ago on our visit to your summer meeting, was the foundation of our fortune, for we had never known any variety where the best picker could pick 180 quarts in ten hours before. We planted it on old ground and on new forest soil, and after some years of success, but no fortune, we have discarded it on account of rust and failure.

Burt may possibly be a seedling of Capt. Jack, and not identical; it does not seem to rust so badly. Plants direct from Miss Burt herself are said to be "Capt. Jack."

Parker Early is commanding a good deal of attention; it is vigorous, early, firm, perfect in bloom, promising and "exceeding 100 other varieties" on some grounds, "fruiting at the rate of 15,000 quarts per acre, two years on the same bed."

Warfield No. 1 promises to be a mate to No. 2; it is a very fine grower and being perfect in bloom, and as Mr. Warfield writes me it is equally productive as No. 2, we have great hope of its general adaptation.

Michael's Early is claimed to be "two weeks earlier than anything else," a persistent bearer, firm, and is exceedingly satisfactory South with us, from last spring's setting of 1,000 plants, it proves the most vigorous grower of anything we ever handled, healthy in foliage, perfect in bloom, good size and quality, firm enough to ship, and if it shall be as productive North as South, it will be our best early perfect flowering kind; South it is in bearing two months.

The above fourteen or fifteen varieties are all perfect in the flower and will do for any pistillates of their season. We shall keep nosing about among the new varieties until we find the ideal berry that will produce from 500 to 1,000 bushels per acre.

Pistillates. Crescent stands at the head of all the old varieties for dollars and cents on all soils and locations, but it lacks firmness on rich soils and in wet seasons. Warfield No. 2 after three years trial we place at the head of the newer varieties as the best shipper, and every other point satisfactory; early and productive to a fault. Bubach No. 5, first for size, productiveness and near market; Haverland is nearly equal in everything but size; Eureka, late, combines productiveness, size, beauty, quality and "after three years trial not a word of complaint." F. T. Lyons, Michigan, says: "Nothing in 100 varieties excels the Eureka." Great Pacific is claimed to be "five times as productive as Bubach No. 5." We hope this may

prove true, besides in Illinois—it certainly shows health, vigor and great push. Lady Rusk, "earlier, larger and more productive than Crescent, better shipper than Wilson, everywhere a success." (Stahl, Illinois.) Mrs. Cleveland, "extra good, *very large*, firm, productive," healthy and vigorous; Miami, one of the best late varieties, everything satisfactory except a little inclination to rust; Princess, one of your own daughters, and we expect she will not go back on Minnesota's record, excelled by none, equaled by few.

Among these ten pistillates there are berries suited to all; the farmer, who does not usually give the best of care; the amateur, who wants a dozen berries to fill a quart; the professional grower, who hopes to clear \$1,000 per acre.

Additional to the above we have 25 new varieties growing on our grounds, the half of their promises we shall not believe until proven. In June and July of 1890 we repeatedly visited F. W. London's field of 4,000 new varieties of seedling strawberries, only one year planted out and the first crop. It seemed to us there were 500 kinds as good or better than most of those now in cultivation; the fruit lay in heaps all over the plantation, and a sight worth going 1,000 miles to see.

Pollen. Doubtless the cross fertilization of a firm berry may impart firmness in some degree, but I have seen more influence of the atmosphere than of pollen, and I have not seen the marked changes in quality and texture that some write about—but it is just as well to plant with this end in view while we have so many varieties to select from.

Every writer should avoid recommending a pistillate without giving it a mate, and it is best to have on one side an early blossom and on the other a late variety. I have grouped the fifteen perfect and the ten pistillates, and choice selections may be made successfully from each.

Some farmers want no pistillates, but I am inclined to think the production of pollen tends to exhaust the vigor and productiveness if not the vitality of the perfect flowering varieties; for as a class the pistillates are much more vigorous and productive when properly pollinated than are the perfect flowering kinds.

Some writers recommend one row of perfect to five pistillates. We want two to four, and better still, every other plant in the same row a perfect flowering sort.

Cultivation. The first year or season after planting should be thorough, frequent, and as the season advances, very shallow near the plants. I have seen twelve dollars mentioned as cost per acre the first year. I should much rather put on \$25.00 per acre and expect 200 fold returned in the first crop.

Hill culture is not generally a success. Half matted rows and then keep the runners cut, will give finest returns of fancy berries; in matted rows of vigorous growers the plants get too thick to give satisfactory size to the fruit. Cultivate and hoe the spring planted bed every week from time of planting till autumn frosts. One plant set in spring is worth 25 set in August. Keep the fruit stems picked off the first season to give vigor and success the following season.

How many seasons shall a bed be cultivated?

For market gardeners one heavy crop and under where the land is under high culture and valuable; for the amateur as long as he can afford to

keep the bed clean and in high culture; for the farmer as long as it pays and one year more, but he should not fail to set out two rows or more every year—and keep those clean the first year, whatever might befall them afterward. Often an old bed will winter without mulch and ripen up a clean, nice lot of berries three or four days earlier than a new bed right beside under the best of treatment, and covered with mulch. All rows should be long enough to cultivate with a horse, saving time and labor.

Winter mulching should be applied as soon as the ground freezes to bear a team, or if not necessary to drive upon the beds as soon as it will bear a man; cover the plants and paths just so you can't see a leaf or the ground with marsh hay, begasse, cut corn stalks or forest leaves held in place by brush or evergreen boughs. Use nothing on the new bed that contains grass, clover or weed seed.

Spring treatment of the strawberry bed has two sides to the question. If I was on high ground I would not move any mulch if the plants could push through—just enough so they could do this, and if weeds did appear, would pull them up by hand or use a butcher knife instead of a hoe up to picking time; if I wanted to do anything to avoid frosts I would remove the mulch from the paths and one-half from the plants—cultivate the paths *lightly* and hoe *shallow* as little about the plants as possible (avoid working among anything while in bloom), stop cultivating long enough before picking to replace all the mulch in the paths and tuck it nicely under the berries. The cultivation warms up the ground and hastens the ripening a day or two and frost does not settle as badly when the ground is not mulched.

Picking is best done by day help and when picking is over give them a chance to weed. In hiring by the quart pay one-half Saturday night, balance at the close of the season. Pay double price on showing days and on the forenoon of the Fourth of July, when it comes on Saturday. We have used a picker's card for many years with a conductor's punch.

Pick the plantation four times a week, picking everything on Saturday.

Box making can be done any time during the early spring, but if you have to hire it done it is better if help is plenty to make them as needed, not more than a week ahead, then they are clean and free from cobwebs and everything else.

Beds after picking—If the plants have exhausted themselves by a heavy crop, burn and plow under immediately and put in some other crop, such as sowed corn, cabbage, beets, celery or turnips. If it is desired to keep the bed another year choose a *windy* day and burn it over, do not burn if there is not a strong wind, as the fire will work too deep by burning. You get rid of very many of the insect pests and it is the best thing you can do for the rust.

Now put in the cultivator and loosen up the paths and make them mellow and fine, hoe and cut out many of the old plants, keep clean and let the runners fill the spaces, give a good dressing of well rotted manure either before or after the cultivation or plowing. The plow may be used if rows were four feet apart, after turning a *light* furrow turn back and reverse by plowing deeply the same furrow, go over the plantation in each space, then put on the harrow and drag it and cross drag till there is nothing in sight but a mellow field. The plants will come through and

do the best with the least tending of any plan we ever adopted for an old plantation. In the small garden patch stretch two lines and spade under a strip of old plants leaving equal amount of new plants to run and cover the fresh dug earth and by changing the strips each year a successful bed may be continued indefinitely if you keep the right proportion of pistillate plants.

More failures among farmers have come from obtaining plants from an old bed, getting all pistillates, than from all other causes; better go or send to some successful dealer and get two hundred plants, four varieties, and set them two rows of a kind and between these rows your plants will be pure for next spring planting.

DISCUSSION.

M. Pearce: I see that our friend Kellogg is opposed to picking on Sunday. It is all right, but I wish to state things just as they are. There is a class of men who believe that the Sabbath was not made for man, but that man was made for the Sabbath, and they do not pick on Sunday at all. They go to work on Monday morning and probably pick from forty to fifty cases of rotten berries, bring them to Minneapolis and sell them. Which is the greatest sin, to pick the berries on Sunday or sell rotten berries? This is just the condition exactly. Now when berries are ripe we have got to pick them or lose money. I believe every man ought to rest one day in seven, but I believe I am committing a great sin when I allow what has been given me to waste, or, in other words, pick them on Monday and sell a diseased article to people. It produces a great amount of misery. Now this is a question we ought to discuss. I have stated it exactly as it is.

E. H. S. Dartt: I think there is another way of getting around this thing without picking on Sunday. We raised quite a lot of apples last season, and I had a Seventh Day man, a man whose duty it was to work on Sunday and rest on Saturday. He picked the apples on Sunday and kept off the boys. Now you must have some Seventh Day fellows around. [Laughter.]

R. P. Lupton: I raise berries and do not market them on Saturday; if they do not keep over Sunday they may rot, and I do not believe we lose anything.

J. S. Harris: I would never pick any berries on Sunday, and my boys, who do the work, say the strawberry bed is much better for its Sunday rest. I pick as closely as I can on Saturday, because that is the day people buy berries to do two days,

and on Monday morning we pick berries for our afternoon trade, and we do not lose as much as those men who pick on Sunday.

Geo. J. Kellogg: We pick our berries on Saturday and keep them until Monday morning following, and we do not have a great many rotten ones. We have the advantage of late selling Saturday night, and we have never lost anything to speak of. We have lost more right in the middle of the week during one of those terribly hot spells following wet weather than in any other way.

M. Cutler: I would like to say a few words in regard to the different kinds of berries I have had some experience with. In regard to the Countess, on our rich prairie soil it is nearly valueless. On sandy land it may do well. I do not think on our rich prairie soil it is a good berry to plant.

Bubach No. 5 does well on our rich soil, but it is not firm enough to ship to distant markets. It will produce more large berries than any other kind I have ever tried.

The two most valuable are the Crescent and the Glendale. I have succeeded best with those two kinds. The Glendale is very hardy, is very profuse in blowing, and makes one of the best fertilizers. The Jessie will do well, provided it is kept covered late in the spring. If a cold spell comes when in blossom they will wilt and drop off.

Col. Stevens: I am sorry to hear my friend Kellogg speak as he does in regard to the Wilson. He says the Wilson is a tender berry. Such is not the case. In some portions of the northwest the Wilson is the favorite berry, and if proper culture is given I do not see why it should run out. It certainly has been the friend of all horticulturists in the United States. It is a berry that grows in Oregon, California, Maine or Florida. I do not think there is any other variety that can take the place of the Wilson.

Prof. Green: There were one or two varieties mentioned as of little value. Mr. Kellogg spoke about the Lady Rusk. I had Lady Rusk last spring. It grew very strong, but when spring came it did not start at all; it seemed to be badly injured in the roots.

As to Park Beauty, Mrs. Bonniwell says it did not do well with her. In my opinion it is the best berry we have, but it should be raised on high clay land. It does very well with me, indeed.

Geo. J. Kellogg: I am glad to hear Col. Stevens pitch into

the Wilson, or into me. I would like the Wilson's friends to stand up and defend it, but the Wilson is not paying one-tenth what it did twenty-five years ago. It has been the finest berry we have ever had in the United States. It has degenerated. I can call it by no other name.

In regard to the Lady Rusk, I think it is one of the best varieties. There is no plant that will do well everywhere. I cannot name five varieties that will do well anywhere.

M. Pearce: I think there is no doubt but what we can grow the Wilson, but no ordinary man can do it, and I will tell you why. There is no plant that grows that is more liable to rust, or rather, fungoid, than the Wilson. I can grow almost as pure a Wilson to-day as I ever could, but you must use a great deal of care in regard to this fungoid. It seems to work more on the Wilson than any other variety. It seems to be sure death, destructive to the crop every time. The plants die off when the fruit is about two-thirds grown. I would not recommend the Wilson for general planting among farmers. An expert can grow them. I do not think the Wilson will ever degenerate, but everybody cannot grow it.

J. S. Harris : I will take some exception to Mr. Pearce. I do believe that the Wilson, which we can procure now, has degenerated and gone back. It is not what it was twenty-five years ago. Twenty-five or thirty years ago I raised as good a crop of Wilson on my grounds as I now raise Crescent, and I have discarded the Wilson, even for fertilizing purposes.

Judge Moyer : I live out in Western Minnesota, way out on the back prairie, near the west line of the state. I have tried a good many years to raise Wilson strawberries, but never could raise any at all. The Wilson is an entire failure out there.

H. W. Gordon : A year ago last spring I plowed up about three-fourths of an acre, which, when I settled on my place was a regular duck puddle—I could shoot ducks there all summer long. A year ago last spring I plowed it up and put it into corn and cultivated it reasonably. Last spring I plowed it again and planted the Wilson, and I never saw nicer looking plants than those Wilson are now. They were entirely free from rust, but what the fruit will be I can tell you better next winter.

M. M. Frisselle : You have heard something about the Wilson and something about rust. Now has some one not some remedy for rust. It is generally supposed there is a de-

rioration in the soil or in the plant, or both, which causes this fungus to act upon the plant. It occurs to me there must be some good reason for the rust attacking plants, and I think one reason is that the soil has been impoverished. Now I recommend that the soil be made good again, and I think the plants will do their duty when we get the soil in proper condition. I think we have something that is a remedy for this rust. It attacked my Wilson last summer very badly, and I made a vigorous application of sulphur to the bed. I bought fifteen pounds of sulphur and put it on the bed and I saved my berries.

President Elliott : How much ground ?

M. M. Frisselle : About four rods by six.

Geo. J. Kellogg : I wish to say one word in regard to deterioration of soil. I have planted on ground that has not had strawberries on for the last four thousand years to my knowledge and the rust is just as bad as on that which has had strawberries for the last thirty years.

E. H. S. Darrt : Although the Wilson may be just as good as it ever was, we have made improvements in the last twenty years, and we have varieties that are just as good as the Wilson ever was.

President Elliott : Professor Lugger, will you please come around here ? We want to get some information from you in regard to this fungus.

Prof. Otto Lugger: The fungus is a disease that attacks every known variety of strawberries, even wild ones. It is a condition of the leaves that attracts the fungus. German varieties are hardly ever attacked by it. Strawberries in the state of nature always grow more or less shady, in which I think we have the solution of the question. If plants were properly protected it would remedy it to some extent, but not entirely so. It is also well known that any plant that is bearing for any number of generations becomes weaker, when it is more apt to be attacked.

In regard to the experiment made with rust, an application of Bordeaux mixture will generally be found effective if well applied. The disease is kept over winter in the form of spore cases. Towards spring, if the conditions are favorable, the spores open and the fungus again attacks the plants. So it is important to remove in the fall as many dead leaves as we can, take them away from the strawberry beds, and then applications

of Bordeaux mixture, say three or four times early in the season, will prove an effectual remedy.

J. S. Harris: In regard to hoeing strawberries in the spring, my experience and my observation have both convinced me that it is dangerous to put the hoe or cultivator between the rows of strawberries in the spring. If you run a cultivator in the strawberry patch on an afternoon of those days preceding a hard frost the next day you will find them done for; and if you run a cultivator through before the blossom they will not fertilize. Now I am convinced that the failure of the strawberry crop spring before last was on account of cultivation. I was in a patch where there should have been one hundred quarts a day picked, but there were not ten. My neighbor had nearly a total failure of strawberries last spring, and he kept his men and women at work in the patch hoeing and working up the soil; on my place where we did not even pull the weeds we had the best crop in fifteen years.

Wm. Somerville: I ask for information. I am going around trying to induce farmers to raise fruit, and especially strawberries, as we know they can be raised all over Minnesota, and I recommend some six varieties that would do best from the farmers' standpoint. These farmers do not want too many varieties, and I have made a selection here of some six varieties that I recommend to farmers, and the information I want is that if there is anything better I want to know it, for the farmer wants the very best he can get. I have recommended the Crescent, Jessie, May King, Captain Jack, Warfield and Bubach. Now if there is anything better I can recommend to farmers, I want to know it.

M. Cutler: I believe by setting two rows of Crescent and one row of Glendale farmers will get more berries than from any other two kinds of the whole list. I know this from my own experience on low land and high land. I have beds that have produced three large crops in succession without any cultivation after the first year. From about one-fourth acre on low land I have obtained nearly one thousand quarts three successive years, and that small patch was not cultivated after the first year. The Glendale is a very hardy variety and holds its own until the berry has exhausted itself.

Geo. J. Kellogg: With us the Glendale has become almost a failure. It produces a large berry with a great deal of straw around the butt end of it. The calyx is the biggest part of the

berry. You put a few in a box and you have more straw than berry. I would refer to another point in regard to the Glendale; it is very late to set beside the Crescent. The farmer can choose as you have four other varieties, and he can have two late ones. Beside the Crescent he can set the May King, either one of those two, and can set beside the latter kinds, Captain Jack. If the Glendale is doing well in your locality do not refuse it. If a neighbor has anything in the way of fruit that is doing well go for that variety, I do not care what it is.

Wm. Somerville: You are well aware that when I recommended our Red Wing people to set out berries they naturally asked the question, What would you recommend? and how would you set them? I have recommended setting alternate rows, one or the other of the five or six varieties, and they have generally been satisfied with that. I have questioned different parties to find out if this gave general satisfaction, and it is the general consent of all parties that that was as good as we could recommend.

J. S. Harris: Mr. Somerville is talking from a farmer's standpoint and I think his recommendation is a good one. The commercial gardener would want to plant a little different. Instead of planting alternate rows he would want as many varieties of the other as he could get, and would want a staminate variety on the outside of them as a fertilizer for the whole patch. As Mr. Somerville's work is with the farmers I think it is a very good idea to have even staminate varieties among the pistillate, but I think it would do as well to have two and two.

Mrs. Anna Bonniwell: I hope if Mr. Somerville comes to our place, Hutchinson, he will not recommend the Captain Jack, because it does not do well with us.

J. H. Wilcox: In view of the fact that our friend Somerville is recommending the list he is giving us to farmers for cultivation, I would like to ask if there is any one present who has had experience with and made a success of cultivating May King?

M. Cutler: I have had the May King the last three seasons. Two years ago last spring I set it out and it does well with me, bearing a good crop. Of course, the two last seasons have been rather unfavorable for all kinds of fruit; but the Jessie I think is ahead of the May King; it is just as rank growing a plant and produces a larger berry, and I would select the Jessie in preference to the May King.

BLACKBERRIES WEST OF THE BIG WOODS.

BY M. CUTLER, SUMTER

Mr. President, Ladies and Gentlemen :

If there is anything that will make a western emigrant's mouth water, and made him think of the days of "auld lang syne," it is the sight of a nice dish of fresh blackberries, sprinkled with white sugar. As I attempt to fix my thoughts on the subject of this paper, memory carries me back to childhood's days, when such a thing as a cultivated blackberry was unknown, and few wild ones obtainable. But what a change twenty-five years have made. To-day the most popular brand of canned goods in the St. Paul market comes from that same county. I refer to the Batavia, Genesee Co., N. Y. brand. So I believe nearly as great a change can be made in fruit growing in Minnesota. The blackberry is a native of this state and no doubt ere the foot of the white man trod its soil, when the fawn bounded over its hills and drank at its limpid streams, the wild savage regaled himself with this delicious fruit.

With the knowledge I have obtained as to its cultivation and management and with the experience I have had, I am fully convinced it can be successfully grown in any part of Minnesota where corn will ripen.

I have about one-half acre in bearing and obtained seven hundred quarts the past season with no cultivation but covering for winter, mulching and mowing out the suckers. The crop would have been larger had not the mice girdled many canes last winter, caused by my covering with hay instead of dirt.

Several farmers on the prairie told me their bushes were well loaded without winter protection, but last winter was very mild and is not a safe precedent to follow. Good plants of the best kinds can be obtained of nurserymen for three dollars per hundred. Snyder for early, Ancient Briton and Taylor's Prolific for late, do well with me. If I wished to enlarge my plantation I would try the Lawton, as I believe with winter protection it would succeed here.

Plow furrows eight feet apart and five or six inches deep. Set the plants four feet apart in the row. Early spring I consider the best time to set them.

Cultivate about the same as corn, keeping the ground as level as possible. Cultivation should cease by the first of August. About the first of November the canes should be laid down and covered. To do this take a five or six tined fork and loosen the ground around the roots, place the tines about two feet from the ground against the bush and the foot against the roots of the bush and gently push it over to the ground, then have an attendant throw on dirt until covered. It is quickly done, and they are safe from the snow and frost.

I think six days labor will cover an acre. As soon as the frost is out of the ground, remove the dirt from the bushes, and raise them to their original position. Set stakes two or three rods apart, and string about number twelve wire each side of the row, fastening it to the stakes about two feet from the ground.

Old bushes should be removed before covering in the fall.

I have never known of a serious case of cholera infantum or other summer complaint where children had free access to plenty of fresh, well

ripened small fruits, and consider the blackberry the healthiest of all. In behalf of your bright eyed children, and noble, self-sacrificing wives, I once more appeal to the sturdy yeomanry of this great western prairie to provide a generous supply of home grown small fruit for your families.

DISCUSSION.

M. Cutler: There is one point we might make in regard to covering the bushes after they are two or three years old, that is in laying them down at right angles with the row, then in taking them up they will lean one way, and the berries will nearly all be on one side of the row, which makes it a great deal easier to gather the fruit.

Wm. Somerville: Before you lay them down you cut all the tops back?

M. Cutler: Yes, sir.

J. S. Harris: The Lawton is a variety that ripens very late. It is also rather more tender than any other variety I have tested, and it is much harder to get out of the ground after it is once in than any I ever got hold of, and I do not think it will bear more than one year out of four.

Wm. Somerville: I would like Mr. Cutler to tell us how he plants and cultivates blackberries for the first two years, as I belong to the institute corps and would like to gather all of the knowledge I can at this place on the present occasion.

M. Cutler: In answer to friend Somerville I would say, as I said in my paper, I would set them rather deep, for this reason: some seasons we are apt to have a dry spell in the fore part of the season, and the blackberries should be set four or five inches deep.

In the second place, I would not make the land too rich; just ordinary soil. If the land is too rich the soil will dry out, or they will make too rank a growth of bushes, and where a bush grows too rank it does not produce much fruit.

They are not likely to grow over two feet the first year. After the first year I would lop them off at about three feet high. Cultivate the same as you would corn, but, as I said in my paper, do not cultivate too late, because this vine gets too much growth later in the season and is more tender.

M. Pearce: There is one point I would like to speak of. The blackberry starts very early in the spring; it is very likely to get too early a start. I think the red raspberry and blackberry should always be planted in the fall; it will do in the

spring, but will give better results by fall planting, because they die back to the ground if planted in the spring.

DISCUSSION ON RASPBERRIES AND BLACKBERRIES.

C. H. Gordon: Mr. Thayer, in your extensive culture of raspberries and blackberries will you please tell us how you lay them down?

M. A. Thayer: The laying down of your blackberries and raspberries is a very important feature in the growing of small fruit, and it seems to me that in this climate it is an absolute necessity for small fruit growers to follow this method, and if you cannot do it successfully then do not raise fruit.

In my plantation the rows run north and south. When the time comes to lay them down I remove the dirt from the north side of the hill, close to the hill, about three or four inches deep. I gather the tops of the bushes in a close form with a wide fork, and then with the foot placed at the base of the hill press down firmly, and that will bend the root at the same time you bend the top; that is, while you are bending over the top press hard with the foot on the base of the hill, which will bend the root and assist in bending over the whole bush. Bend it in the root or ground and lay the bush towards the north. Then the next hill I lay down in the same way so that the tops reach the base of the preceding hill, which makes a continuous row. In laying down the bushes it is of great importance, and facilitates the work very much, if the roots are bent in. Two men can lay down a half acre of bushes a day. I laid down twenty-five acres this year and covered them with dirt, just enough dirt to partly cover them. Red and black raspberries that are hardy I merely cover the tops. The Ohio, which I consider as hardy as any black raspberry, I covered a portion of, last year. Those not covered yielded a bountiful crop, but those covered paid enough extra to pay for the work. I cut out the old wood as soon as done bearing.

R. P. Lupton: How many canes do you leave in a hill?

M. A. Thayer: For raspberries I usually leave six or eight.

Dr. Frisselle: How near are they together?

M. A. Thayer: Three feet in the row and seven feet apart. I pinch the canes off at about eighteen inches. I think it is an absolute necessity to success. I pinch the new growth when it is about eighteen inches long. The laterals I cut back to ten or

twelve inches. With blackberries it is different. You understand that the fruit is produced on the end of the laterals, and if you trim those laterals you destroy the crop, while in your black raspberries they should be cut back to make a success of it. I have pruned my blackberries to prevent an overproduction of fruit. The laterals grew out so thick and were so crowded with fruit that if allowed to grow to the full extent there was danger of injuring the whole crop, so I cut back thirty to forty per cent. of the fruit. I go through with a sickle and cut them off two feet or such a matter, and in the spring of the year I trim them back more. My red raspberries I pinch in the spring when about eighteen inches high, but I do not trim in the spring.

C. H. Gordon: Please state more accurately in regard to the trimming of blackberries.

M. A. Thayer: To grow blackberries, you want to pinch your canes at twenty inches high, eighteen or twenty. It is best to keep them low; it causes those laterals to grow stronger and in greater abundance. We want them low on account of laying them down. I do not trim any more in the spring. I do not trim off those laterals.

C. H. Gordon: Do you trim any time during the summer?

M. A. Thayer: I leave that all summer. The fruit of the blackberry grows on the end of the vine.

R. P. Lupton. You speak of your rows running north and south; why is that?

M. A. Thayer: If you lay out your rows north and south you get an equal distribution of the sun during the season, that is one thing. Another, by laying them north and south as you raise them up in the spring the bush is inclined to the north, the new shoots come out on the north portion of it, and during the heat of the day they are protected from the direct rays of the sun. Understand me, in the growing of small fruits there can be no iron-clad rule laid down in regard to those minor details. The location of the place of planting, the quality of the soil, the variety of the plants, the manner of cultivating and trimming must depend largely upon circumstances, and they must be determined in a large degree by your own judgment. But in the growing of small fruits there are certain principles or certain necessities that cannot be omitted without loss or probable failure. The ground must be rich and well cultivated, the plants must be vigorous and of a variety suited to your locality.

C. H. Gordon: Are you in favor of rich land for blackberries?

M. A. Thayer: No, sir.

O. F. Brand: Clay soil or sandy soil?

M. A. Thayer: Sandy soil.

C. H. Gordon: Have you tried strawberries on marshes?

M. A. Thayer: No, sir.

Mrs. A. Kennedy: Do you get a larger amount of fruit on the north side than on the south side?

M. A. Thayer: Yes, I think I do.

C. L. Smith: I think there is only one thing in which Mr. Thayer should make a correction. When he spoke of laying them down he said he would take away the dirt to the depth of three or four inches. My experience is that six inches is better.

M. A. Thayer: Ordinarily three inches will do, but when the season is very dry we must take six.

QUESTION BOX.

1. "What is the actual cost per quart of strawberries ready for market? What for blackberries?"

E. H. S. Dartt: That cannot be settled definitely.

M. Cutler: It depends upon labor and the price you get for your crop.

Geo. J. Kellogg: Three cents per quart for strawberries.

2. "How much will it cost to place one acre of blackberries in bearing condition?"

Geo. J. Kellogg: One hundred dollars.

3. "How shall we protect small fruits in winter?"

E. H. S. Dartt: Cover them.

M. Cutler: I would say to whoever asked that question that if he will read our horticultural reports for the last three or four years he can get the information.

4. "Where can shepherdia argentea (buffalo berry) be obtained for a reasonable price?"

Pres. Elliott: Oliver Gibbs, Jr., Ramsey, McCook County, South Dakota.

5. Which is the best time to transplant currant bushes ten or twelve years old, and how far should the tops be cut back?"

Pres. Elliott: The best time is then to put them in the brush pile and take new stock.

6. "Is the Crandall currant hardy in Minnesota?"

Prof. Green: It stood last winter successfully. This is not an endorsement.

7. "What are the best five varieties of strawberries?"

Geo. J. Kellogg: Jessie, Wilson, Crescent, Bubach and Warfield.

J. M. Underwood: Crescent, Warfield, Wilson and Captain Jack.

8. "What mulch is best for blackberries and raspberries."

C. L. Smith: Cultivation.

9. "What is the best method for keeping accounts with berry pickers?"

Geo. J. Kellogg: Mr. President, we have adopted a card with figures and letters which will contain about three hundred quarts and every quart is punched with a punch carried by the overseer in the patch. We pay off every Saturday night. There are those who use tickets for each quart. We punch on this card from one to eight quarts. Our carriers contain eight quarts. I like that plan of using a punch a great deal better than using tickets. Some have one way, some another; any way to keep the account straight and satisfactory.

PARK ORNAMENTATION.

ADDRESS OF PROF. SAMUEL B. GREEN, BEFORE THE ST. ANTHONY PARK CITIZENS' LEAGUE, MARCH 3, 1891.

(Furnished for Publication by Request.)

Mr. President, Ladies and Gentlemen:

The subject given me for this evening is that of flowers for park ornamentation. I shall not stick very closely to the text assigned me but will follow the example so often set by illustrious ministers of having a text and reading it and then talking about anything they choose.

MULCHING TREES.

I wish first to speak of the subject of mulching trees. All newly set trees that do not have the soil frequently stirred around them should be mulched. This should consist of grass, sawdust or other material that will protect the surface of the soil from evaporation. It should extend for at least two feet on all sides of the tree, and is nearly as essential for trees that are as for those that are not to be watered. The neglect of this precaution by planters is frequently a cause of great loss.

PROTECTION.

Many trees are set out without their stems being properly protected. All street trees should be covered in some way against stray animals, or those belonging to the vicious, careless or lazy who alone tie horses to, or

allow them to gnaw street trees. If no other method seems available a very effective and always successful protection may be secured by wrapping the trees with old pieces of bagging or other cloth, but as this is not very ornamental it would look better to use some of the more improved ways.

PRUNING ELMS.

Most of the elms that have been set in the park were set as bare poles and after a season's growth many pendulous branches have generally come out near the top. It will be a good plan to at once cut these branches back to within an inch of the main stem. After this treatment the buds at base will start strongly and the trees will be of much better form than if left to grow naturally.

PLUM TREES.

There seems to be a very general impression that fruit trees can not be successfully grown here in gardens. I think this a mistake. If you do not plant any other fruit you should at least plant a few plum trees of the improved native sorts. Some of these are as hardy as elms and bear an abundance of good sized fruit of excellent quality. The De Soto is the variety that generally gives the most satisfaction in this state.

SHRUBS.

There seems to have been little attention thus far paid to improving our park by planting flowering shrubs. This is an important line of work for beautifying our homes. It can be overdone, but there is hardly a lot in this park but what would be greatly improved by a judicious planting of them. They form admirable screens to protect back yards from too great publicity and to cover up unsightly outbuildings; to define without stiffness the outlines of your property, and to set off and as it were serve as jewels in the lawn frame surrounding our home. Besides which they may be so selected that you will have some of them in flower during nearly all the entire growing season.

Among those which are perfectly hardy and thrive with very little care are the following:

Missouri Currant.—This well-known hardy shrub is one of the cleanest early spring flowering plants that we have. It grows strongly and flowers profusely, and is well adapted for the purposes of screens and ornamentation.

Lilacs.—All of these except the narrow leaved kinds are very desirable. The white variety is probably the most attractive. They are very valuable as screens and for hedge purposes. The common purple kind is a freer grower than the white.

Spirreas.—Most of the shrubby spirreas are hardy and desirable here. I would call especial attention to S. Van Houtii, S. Douglassii, S. Reeosii, and the Golden Leaved spirea. The latter is very pretty in both flower and foliage.

Snowball.—You have all known it from childhood. It is very attractive with its white balls of sterile flowers.

High Bush Cranberry.—This is the natural form of the snowball, and it bears edible fruit and grows in our native woods. It is pretty in flower and foliage, and is especially attractive in autumn when loaded with its red fruit.

Bush or Tartarian Honeysuckle.—These are all hardy and desirable. They grow about eight feet high and flower profusely every year. There are several varieties, which differ principally in the color of the flowers.

The Snowberry is a nice clean shrub, which bears white berries that hang on the branches all winter. Very desirable.

The Garland Syringa is hardy and a good, free flowering shrub. It should have a somewhat protected location. The flowers and their delicious fragrance and beauty are well known to you all.

A very pretty shrub is the Red Twiggled Dogwood. It is a native of our woods and makes a nice lawn plant. Its white corymbs of flowers are very attractive in summer, while its red bark is an attractive feature for a winter landscape.

Buckthorn.—I refer to the well-known English buckthorn so often used in the eastern states for fine hedges. It makes a fine hedge or lawn tree here, is perfectly hardy, and will withstand almost any amount of dry weather or cold.

Hydrangea.—The hardy hydrangea is, I think, to-day the most popular lawn shrub grown. It flowers in August, when most other flowers are gone, and its great nodding panicles of white flowers are very beautiful while they remain white, and, in fact, until they drop off on the approach of winter. It is quite hardy, and every lawn should have at least one such representative.

The Red-Berried Elder is a native shrub of much value. The Buffalo Berry, which is grown on the prairies of the Dakotas and in most severe exposures in Montana and Wyoming, is very beautiful with its white foliage and trim habit. It is dioecious, and so one must have both pistillate and staminate forms to secure the beautiful red fruit for which it is noted.

ORNAMENTAL VINES.

Probably the best ornamental vine we have is the *Staminate* form of our native grape. It is perfectly hardy and a vigorous, clean grower of good habit. The flowers are not conspicuous, but have a fragrance which I think fully equal to that from the English violets. It is invaluable for covering verandas and out-buildings.

Woodbine, Virginia Creeper, or Five-Fingered Jack, by each of which terms it is designated, is a native plant and very popular wherever known. It is used in great quantity wherever gardening is an art. It is well worthy a place near your front porch, and will repay good care and generous manuring as quickly as any climber I know.

Clematis Viticella is a desirable climber with purple flowers and should have a chance for it is very hardy and flowers nearly all summer. It will make a pleasing contrast with the Virginia Creepers. Many others might be mentioned but these are most valuable.

WINTER GARDENING.

I wish now to call your attention especially to a phase of garden ornamentation, which is at present attracting much attention in some parts of this country and Europe, and that is to planting so as to secure a bright and pleasing effect from our gardens and lawns in winter as well as summer. This is very important and is essential to the highest adornment of our homes. In some of the eastern states there are very elaborate plantings made with this especial purpose in view. However, they

have many hardy plants there which we cannot grow here that are very effective when thus used, but we, too, can do much in this line. For this reason we should use evergreens of various kinds and forms, but as their habit is rather sombre and heavy they should be enlivened by contrasts with the bright bark of the golden willow or red-twiggled dogwood and the white berries of the snowberry, the scarlet fruit of the bitter-sweet, the bark of the white birch, etc. This is a very delightful form of gardening, and when once attempted will lead to most satisfactory results. It prolongs our interest and pleasure in the garden and plants throughout the year, and surely it will add much to the attractiveness of this beautiful park.

QUESTION BOX.

1. "What are the best hardy flowering shrubs for Minnesota?"

Sec. Green: In the report for 1890 there is a good article on shrubs for general planting by Gus. Malmquist.

President Elliot: We have in our own state some of the finest hardy shrubs in the United States,—our own natives,—and I hope some one will take that thing in hand and go to cultivating hardy shrubs. Our park commission here is using a great many of them in the parks.

2. "Is *rosa rugosa* (the single Japanese rose) hardy in Minnesota?"

Prof. Green: We have it, but I do not know that it is of much importance.

3. "'*Cornus florida* (flowering dogwood) is reported as growing wild in southeastern Minnesota. Is it hardy in cultivation?"

J. S. Harris: I doubt very much about its being hardy. In the winter of 1872 and 1873 there was a plant reported on the Red river, but I have never seen it.

FLORICULTURE.

THE CHRYSANTHEMUM SHOW.

BY COL. J. H. STEVENS, MINNEAPOLIS.

Mr. President, Ladies and Gentlemen:

I am down in the program of this session to address you on the first "mum" exhibition in Minneapolis. The word "mum" originated with John Thorpe, of Pearl River, the first president of the American Floral Association. I do not think that our executive committee who arranged the program, expected that I should exclusively use that word on this

occasion. Be that as it may, I prefer to leave provincialism out in this address, and sp-ak of the original name—the chrysanthemum—the primitive color of which seems, from the derivation of the word *chrysoς*, gold, and *anthos*, flower, to have been yellow; it belongs to the same natural order as the daisy. Its origin is very remote, cultivated varieties having been in existence in Japan and China for at least 2,500 years, and are supposed to have been derived from an indigeneous plant, the *chrysanthemum indicum*, the flower of which is small, single and of a yellow color. In 1824 there were only about thirty varieties in England; now there are hundreds, if not thousands, and in this country there have been 239 new varieties registered with the secretary of the American Association; all of a recent date—for it has only been a few years since its introduction in America for general cultivation.

November, the month of short days, and so often gloomy skies, brings the annual glories of the chrysanthemums. The first exhibition in Minnesota was held under the auspices of our worthy president, Wyman Elliot, in this city during that month last autumn, and it brought the annual glories of the flower. Nowhere in all the year was there a time when there was gathered such a variety of brilliant colors. Its wonderful variety, both of color and form, is the most remarkable thing about it. These late flowers are not marked like the roses and violets by sweet odors; nature gives fragrance to her spring blossoms, rather than to those of the autumn. But she compensates these latest of all the year's flowers by giving them, instead of fragrance, such a dazzling blaze of varied colors, that in the collection like the exhibition in Minneapolis, where the best kinds were seen, the visitor was half dazed by the brilliantly contrasting glories, on all sides, and he hardly knew which way to turn. The brightest, most showy flowers were those of the deep, intense golden hues, of which there were many shades and varieties—the king of all being the Golden Dragon, the imperial national flower of Japan. Its splendid beauty, in its flowing and gracefully twisted petals, has not yet been surpassed. Some of the gorgeous velvety red varieties are highly attractive; while the finely shaded, delicate pinks constitute a charming class, some of which are exquisitely beautiful. The incurved terra-cotta colored kinds, making the flower almost a large ball, the petals reddish on one side and cream colored on the other, were much in favor with the visitors, as were some of the streaming-petaled pure white varieties, whether incurved or twisted. Of the whole immense exhibition such pure white kinds as the Robert Bollomly were deservedly favorites. The intense deep gold of the Solomon's Temple, is sure to catch and hold the eye; while some of the fluffy golds and whites of various names were not less attractive.

The rapid and enormous development of the chrysanthemum within the last half a dozen of years, is one of the most remarkable illustrations of the possibilities of the Darwinian law of evolution. China and Japan were far in advance of us in this art, for art it certainly is, and it is from their splendidly developed varieties that this country and Europe have obtained many of the most admired existing kinds. But, backward as our country has so long been in its appreciation of this showy autumnal flower, it is making amends for the deficiency, and with characteristic haste and fervor. In many of our eastern portions the annual chrysan-

themum show is already one of the minor events of the year. At last it has reached Minnesota, and Minneapolis as usual led the van in the celebration last November. It was remarkably attractive in the great range, variety and wonderfully developed beauty of the many styles exhibited. We were all surprised; not one in a hundred of the visitors had any idea that such a pleasure awaited them in the two halls where the flowers were exhibited. The florists and gardeners are fully up to the importance of producing new varieties of their own for our Minnesota citizens. It is one of the wonders of the chrysanthemum that the plant is susceptible of such an almost endless development of form and color; new kinds are brought out constantly. There seems to be no end to its possibilities. As yet but one or two of so-called fragrant varieties have been produced; the realm of sweet odors is one into which the enterprising developers of these showy flowers have not yet succeeded to any marked degree in leading them. But that domain, too, is no doubt ere long to be conquered and made to yield its attractions to the chrysanthemum, as already done by the world of colors.

In this latter field little apparently remains to be achieved. With the exception of bright blue and clear scarlet, we recall no hue or shade of color in all the great chromatic scale, that it has not required. When these colors shall have been obtained, and a varied fragrance added to the charms of the many kinds, what more can be desired for this superb flower of autumn?

Which is the most attractive flower—the rose—queen of flowers, and full of all sweetness; or the big curled and tangled blossoms of the chrysanthemum, in their rich, deep gold, their velvety red, their many shades of pink and all the other hues—not excepting what is perhaps the most charming of all—the rich, pure virgin white. The queenly rose, though she lasts only a day or two at her best, while the chrysanthemum lasts two or three weeks, will nevertheless doubtless remain the favorite flower; for her beauty and sweetness combined, she can never be dethroned; but the chrysanthemum makes a far greater variety of fine colors. There was at the Minneapolis exhibition a perfect blaze of gaudy hues, in all wonderful contrasting effects. The rose imparts her glory, says Prof. Chamberlain, to the month of June, but the chrysanthemum in almost endless variety and matchless beauty crowns the year with its wealth of bloom. In its delicacy of color, its wonderful diversity of form, and its exuberance of blossoms, it has no rival. Neither the frosts of autumn, nor the threatening storms of winter can do more than to heighten the contrast it presents with all of its surroundings. The rose has long since faded, the lily, the aster and their hundred companions, have fulfilled their annual mission. At the dreary season of decay, when all nature besides is waiting for the coming of winter, the chrysanthemum bursts forth from its seeming lifelessness, and ushers in the coronation of the year. No other flower is left to dispute its supremacy or share our admiration. They are autumn's latests and richest gifts. When field and garden are in the faded leaf, and in all the uncleanly disarray of the ruin by frost, the chrysanthemum is left for the pleasure of mankind.

DESIGNING FLOWER BEDS AND GROUPING PLANTS FOR EFFECT.

E. NAGEL, MINNEAPOLIS, PRESIDENT STATE FLORISTS' ASSOCIATION.

The size and character of flower beds are the first things to be considered. They should depend upon the area of the grounds to be improved. If they be large, proportionately large beds, occupied even by the larger foliage plants, like the cannas, caladiums, etc., may be laid out with good effect; if they be small like a single city residence lot, it is usually better to lay out smaller beds and confine the planting to lower growing plants, like geraniums, coleus, pansies, etc.

A bed 12 or 14 feet in diameter may be considered a large one and suited only to a large lawn. The size may be decreased from this extreme to three feet in width, as suited to a very small lawn.

The shape of the beds may be almost any imaginable; round, oval, square, a crescent, a star, etc., but the round and the oval shapes are generally found the most pleasing.

To prepare the bed, mark its outline on the lawn, dig out the earth to the depth of 18 to 24 inches, and fill the hole with good, rich, black soil mixed with only well rotted manure. The soil for beds to contain rank growing plants like cannas and caladiums should be made especially rich. A bed 10 or 12 feet in diameter should be raised in the center two feet and be rounded off gradually to the level of the lawn at its edge. Smaller beds should be raised less in proportion to their size.

Avoid a location under the drip of trees or that does not allow the sun's rays to fall full upon the bed during a good part of the day.

As to the selection of plants our experience shows that there is much need of information, and the directions here given will be found of great practical value to all who plant flowers.

It is not strange that people are misled by the glowing descriptions of wonderful new flowers that are annually pictured in the elegant florists' catalogues. Try these varieties if you will, but in a bed off by itself, and reserve the beds in your lawn, that are planted for pleasing effect, for the *very few* varieties which experience shows are best adapted to that purpose. Avoid also the common mistake of planting too many varieties in one bed, if you would secure the best results.

The following is a short and select list of the most satisfactory foliage and flowering bedding plants, viz: alternanthera, castor oil bean, caladium, canna, two kinds of coleus, Fair Oaks and Verschaffelti; four kinds of geraniums, three scarlet, Queen of the West, Illuminator and S. A. Nutt, and one pink, Mrs. Hautboy; pansy and verbena; and for the border or edging of beds especially, blue ageratum, centaurea, cinaria maritima, sweet alyssum and two geraniums, Mountain of Snow and Madame Sallerol.

The proper distance apart to set these plants is as follows, viz: cannas and castor oil beans, 20 to 30 inches; caladiums, 12 to 18 inches; geraniums and coleus, 10 to 16 inches; border plants, 6 to 10 inches; verbenas, 8 to 12 inches; pansies, 6 to 8 inches; alternanthera, 4 to 6 inches. The shorter distances given produce the closest and best effects.

In arranging plants in the beds, the tallest should always be selected for the center, and the rest be set to decrease regularly in size from thence to the edge.

Foliage beds are best adapted to large lawns. They should be raised rather higher in the center than other beds. A magnificent effect is produced by a foliage bed 14 feet in width, raised 4 feet in the center, planted with first, in the center, three castor oil beans, set at equal distances from one another; next, two rows of cannas, next, one row of caladiums, next one row of Verschaffelti coleus, and last a border of one row of centaurea or Dusty Miller. Smaller beds can be made with good effect from the same material.

Very showy foliage beds are made of coleus, using only the two kinds named, the Verschaffelti, a rich, dark brown, and Fair Oaks, a bright, golden yellow. With these two colors are planted all kinds of figures. As an example of arrangement, a beautiful effect is produced by a star-shaped bed, the star formed of yellow coleus, with a border all around of the brown, and an edging of centaurea or cinararia maritima.

Geranium beds. There are a great many kinds of geraniums, but only a few well adapted to bedding, of which those before named are the best. To obtain the most pleasing effects, plant only *one kind* in a bed, with a single row around the edge of sweet alyssum, or any other one of the border plants previously named.

The alternanthera is a very dwarf-growing foliage plant in several colors, used mostly for working figures or letters on the lawn, producing a very nice effect if kept properly sheared.

Pansies and verbenas show best in beds by themselves. Beds of the former should be replaced after midsummer by some other plant.

Beds for growing cut flowers should be made of mixed plants. One to hold 100 plants might have in the center three heliotropes, six fever-fews, four white marguerites, four assorted carnations, and three rose geraniums, all mixed together as much as possible; next around these, forty assorted geraniums, double and single, mixed together; and for the outside of the bed, verbenas of assorted colors. Such a bed would be very attractive and furnish a good variety of cut flowers.

For long, narrow beds, along a walk, a fence, etc., technically called "borders," use in the center row well mixed together, dahlias, marigolds, gladiolus, salvia splendens, hollyhock, helianthus, or other high plants, placed 18 to 24 inches apart, and in the outside rows, low plants like verbenas, phlox Drummondii, dwarf nasturtiums, etc., at 8 to 12 inches apart.

The description of different beds might be continued at great length, but instead the reader is asked to apply the general principles above outlined, and select from the infinite variety of attractive forms and combinations possible within the limits of good taste and pleasing effects.

THE CARNATION.

By F. G. GOULD, EXCELSIOR.

(Read before the State Florists Association.)

The carnation pink has come into commercial importance in our country during the past thirty years. It is scarcely twenty years since its culture for florists' use began. The great improvement in the size of the flower, together with its grateful fragrance, bright colorings, and

lasting qualities, has placed it near the front in public favor. The original clove-scented dionthus had but five petals, with a diameter of the expanded flower of about an inch. They have been bred up from this original state to from twenty-five to fifty petals, and a diameter of flower of two to three inches. Only twenty years ago the camelia was at the front for commercial purposes. At that recent date the rose had not been recognized. Today, the rose is queen and the camelia is almost forgotten.

Probably, there is at present as great a number of carnations grown for florists' use as there is of roses. Their popularity is yearly increasing, but never so fast as at the present time. We are hardly prepared to believe that they will supplant the rose, in the immediate future, but when so much effort is being expended on anything capable of improvement as there now is among growers of carnations all over the country, we may hold ourselves in readiness for any surprise in this direction.

The carnation is of comparatively easy culture; a perennial, requiring two seasons to complete its ordinary but full measure of development. The nature or economy of the plant requires a season of rest in preparation for that final effort to reproduce its kind. The florist, to accommodate the requirements of his business, has substituted for this natural habit of the plant the custom of winter forcing for the production of flowers. The customary method for the production of plants is by cuttings or side shoots from the main stocks, though it is held by some (and I am convinced there is substantial reason for the belief) that, in order to keep up the original standard vigor of the plant, new seedlings will be required.

Carnations require to be planted out in the open ground, in a situation which is well drained. They will not thrive with too much moisture about their roots, either in the open ground or greenhouse. It is surprising to note the small amount of root moisture required for their fullest vigor and healthfulness. The foliage will be benefited by frequent spraying and the plant will be generally benefited thereby.

The carnation is a cold blooded plant and should be treated accordingly. I believe that over-forced carnations have their vital forces so impaired that they will never after be capable of producing first class flowers.

VARIETIES PROFITABLE TO CULTIVATE.

A carnation, to be worthy, should possess one at least of the following points of excellence:

Flowers on long stems.

Healthy habits and vigorous constitutions; not difficult to grow from cuttings.

Good sized, well formed flower, never bursting its calix, which gives a ragged, bedraggled appearance.

Attractive color, and a good keeper as well; and last, but not least, a floriferous habit.

Among the tested varieties in cultivation possessing these qualities to a marked degree, I will name the following as the most conspicuous, and therefore the most useful sorts: Tidal Wave, Portia, Garfield and Hinzie's White,—all very floriferous, easily propagated, vigorous, healthy habit, well formed flower. A person who would fail to grow these successfully had better go out of the business. Anne Webb and Pride of Kennet, pretty crimsons, both fragrant and fairly prolific, and of healthy habit.

L. L. Lamborn (at the present time made unduly prominent) is an average size, clear white. The blooms are inclined to tip to the side, giving a droopy appearance and a crooked, very brittle stem which is liable to break near the base of the flower; a rather shy bloomer, consequently an unprofitable variety.

Grace Wilder, medium or below in size, is at its best the most exquisite shade of pink known to flowers,—delightfully fragrant and attractive. Its conspicuous faults are a weak calix, liable to burst, a shy bloomer, producing less than half the flowers of a Portia or Tidal Wave; also lacking in constitutional vigor, therefore not a profitable variety.

I have called attention to the chief points of excellence in the best known of the sorts now grown for commercial purposes. This occasion will not permit a description of many worthy varieties that claim public attention.

Constitutional hardihood is an important quality in a plant. Possessing this it starts out with this advantage over the weaker ones, that throughout its life journey it is better equipped to withstand the vicissitudes which will beset it between the cradle and the grave. Hitherto, the carnation has not been used for a lawn or garden plant to any considerable extent. I apprehend the reason for this lies in the fact that the public has not hitherto been supplied with the proper kind and quality of plants for that purpose. I predict that we are on the eve of a new departure which will introduce the custom of planting the carnation on the lawn and in the garden, as it is the most available first-class flower in the whole list.

PANSIES GROWN IN COLD FRAMES.

By GUST MALMQUIST, MINNEAPOLIS.

(Read before the State Florists Association).

For amateurs and florists with limited greenhouse space, this method is of especial value and it is certainly the cheapest way of growing them for all. We all know that pansies are almost hardy and will live over winter with only slight protection; on this basis I treat my plants. I plant the seed about the first of September in boxes and keep this outside in frames with plenty light and air so as to prevent the plants from being drawn. The seed should be planted thinly so as to give the young plants plenty of room, then there is no need of transplanting before they are ready to be planted in the frames. The last week of September they are usually ready for transplanting.

A common cold frame is then prepared and the young plants planted in the usual way in rows, about one hundred and fifty plants under a sash three by six feet. Sashes are then put on and kept close a couple of days with light shading added if clear weather, after that plenty of air and light are given, so as to make the young plants sturdy and harden them off. The sashes are kept on all the fall and when cold weather sets in additional covering of boards or shutters is added. When hard frost is at hand, the whole frame is allowed to freeze solid, and then the frames are covered up with long manure and banked all around. This covering is to

prevent occasional warm spells throwing out the plants. If too long warm weather continues the frames should be opened up and air given occasionally to prevent the plants from starting to grow.

The latter part of March or when warm weather is at hand the frames are uncovered and plenty of air given, but no light is given until the plants are thawed out, that is the sun should not be allowed to work on the plants before they are ready to grow. Plants thus kept will make strong healthy plants and may be uncovered quite early and the sashes used for other plants.

CULTURE OF VIOLETS.

READ BEFORE THE STATE FLORISTS' ASSOCIATION, BY E. A. VENZKE, ST. PAUL.

The cuttings are taken from the blooming plants about the 15th of March. By that time the main runners are in right condition for propagating, although if enough plants can be sacrificed it is best to use the younger crowns, as they invariably make the best and strongest plants. They are at once potted in 2½ or 3 inch pots, for they can all be had with roots, and put in a light, cool place in the greenhouse. Care must be taken that the young plants are well syringed, for during the month of April the red spider will very quickly attack them, and in almost every case destroy them, or make them useless to plant out. They should be set out quite early, say about the first week in May or even earlier if the weather is thought favorable, so that the young plants may get a fair start before hot weather sets in. During the months of July and August extra care must be taken that the plants do not suffer for the want of water, for right there is where the so much dreaded violet disease originates, although a majority of growers claim it originates in the greenhouse. Such is not the case. To my belief it originates during the hot and dry summer months, but seldom makes its appearance to any extent before the plants are housed. During dry spells they should be watered thoroughly at least twice a week, which will also prevent the red spider from getting the best of them. By the 15th of September they will be ready to be planted on benches in the greenhouse or in the violet pit. A good preparation of soil for violets is one part of heavy clay, one part of rotted sod, one part of well rotted cow manure (the latter should be at least three years old) and one part of very coarse gravel, put on the bench to the depth of at least 5 inches. With sufficient drainage this has given good satisfaction.

After planting on the bench they must be syringed freely and given plenty of air both day and night as long as the weather is favorable in order to kill off all the red spiders which may possibly have been brought in from out of doors. The first perfect flowers may be expected about the 15th of October. With a temperature of 45 to 48 degrees at night and 60 to 65 during the day the plants will be kept in a good, healthy, growing condition. About the middle of January they must have several feedings of liquid cow manure in short successions; they will then continue to bloom until April or later, provided the red spider, which is one of the greatest enemies to the violet, is kept under control.

By this treatment the results will be perfect flowers in size, shape and fragrance; in fact, a flower that will recommend itself and sell at sight.

As to varieties, we like Victoria Regina better than any other we have tried. It is superior in color and seems to stand our hot, dry summers better than all others.

GREENHOUSES AND HOTBEDS.

REPORT ON GREENHOUSES AND HOTBEDS.

BY GUST. MALMQUIST, MINNEAPOLIS.

My report on greenhouses and hotbeds for the last year will of necessity be short as no special new features in construction, etc. have been introduced during the season.

Quite a number of new greenhouses have been built, but no special improvements have been made, except in glazing, the Gasser's zinc joints have been used to some extent, and reported favorably, as it strengthens the roof and makes the houses more air tight, which certainly in the winter time effects a saving of fuel.

However, if it benefits the plants, it is a question which is open to discussion, and has to be decided by experience. The cost of those joints is nearly made up in less glass needed.

For heating, steam is universally used now in any new structures and the system of overhead heating seems to be preferred.

Hotbeds for forcing vegetables and spring plants are more and more superseded by houses heated by steam or hot water, and such houses will be found cheaper in the long run than the old style of hotbeds, even taking in account the assistance of nature in handling the hotbeds.

GREENHOUSES AND HOTBEDS.

BY E. NAGEL, MINNEAPOLIS, MINN.

I think there has been a great deal of improvement in greenhouses, as in everything else, in the last fifteen years, and it is likely to continue so. To build a greenhouse in the best practical manner, and at the same time the most economical way, is perhaps the most important part of the construction to the working florist and other men of moderate means, and to show how to do that is my present purpose.

If for beginners, I would advise them to work out a plan suitable to all their future requirements, and start the first house so as to form a part of the whole system complete. In locating, it is advisable to get a position as nearly facing the south as possible and a gentle slope towards the south, say not more than four feet in one hundred, which will allow more sunlight in the houses, is an advantage. If more than one house is to be built, if the slope is more than four feet in one hundred, I would prefer level ground.

Having selected the location, the next thing is to consider the size of the houses, and I should say that having tried nearly every size and shape I have come to the conclusion that a house of moderate size is by far the

best for every purpose; a very wide house is objectionable on account of not getting the plants near the glass, and if the benches are raised enough to get the plants in a proper place, it is more work to care for them. Climbing up and down the benches to work among plants is hard work and takes more time than to be able to reach any place in the house from the walks on the ground. My experience has taught me that a house 16 feet wide in the clear is by far the best and most convenient to work in. Have the roof slanting both ways, on one side the rafters should be twelve feet long and on the other side eight feet, which will, when the walls are three and one-half feet high, make the ridge board about nine feet high. The long way of the rafters should be slanting to the south. Have two walks and three benches, the side benches each three feet wide and the walks each two feet wide, which will leave six feet for the middle bench. In this way it is easy to see all plants on the benches and get to them to clean and care for them. When it is, convenient I would certainly advise to build them that way. Any desired length will do, but if it can be had 100 feet is best.

The most convenient way to start a range of houses is to build so as to connect them so as not to have to go out of doors to go from one house to the other, which can be done in the following way:

Put the boiler shed on the northwest corner of your lot, and from there run a head house running south either the whole length of your plant for the future or any part of it, and it can be lengthened at any time. Have the roof slope all to one side, that is to the west side. If the roof slants both ways you will either have to connect your other houses with a valley running up to the other roof or the snow and ice will drop on your glass; but this way the ice will all slide from the west side. In building a head house the wall facing west should be three feet high with two and one-half feet upright glass on top of it, which will make it five and one-half feet high, and the back wall should be three and one-half feet with eight feet of glass on top, which will make it eleven and one-half feet high, house to be eighteen feet wide. When the wall on the back is made the whole plan of houses should be laid out in it and the rafters put in to connect the other houses to them. Whenever there is to be an addition made all there is to do is to cut a door in the wall and connect to those rafters. These houses as described before should run east from the head house and face south. The best and cheapest way is to have them joined together with a gutter between them about twelve or fourteen inches wide. For the walls set cedar posts; board on both sides; put tar paper and siding over this, which will make as warm a wall as if built of brick and the cost will not exceed one-third and will last for twenty years, if kept well painted. All material above the wall, such as sash bars, gutters, ridge board and purlins should be made of cypress, and can be bought in Chicago all cut and fit, ready to put together, if exact plan of house is sent. Any one acquainted with carpenter tools can put it together without the help of experienced carpenters. In fact there are only a very few carpenters that know much about building greenhouses. I will not say much about hotbeds, for I think the greenhouses will eventually take the place of hotbeds. There are many vegetable gardeners now that build greenhouses out of their hotbed sashes, for they can

do their work better and get to their plants at any time and in any kind of weather, and the cost of heating with steam or hot water is not much more than to make them with manure. As to heating I would prefer steam unless I had only one small house, then I would prefer hot water which you can leave longer without attention.

VEGETABLES.

REPORT OF COMMITTEE ON VEGETABLES.

BY J. ALLYN, RED WING.

My report on vegetables will be brief, hoping the other members of the committee will do better than I have done.

The past year has been remarkable for its changes, yet the vegetable crop has been a success, except onions and potatoes, lack of rain during the month of July affecting these in many places.

The planting of onions and potatoes as early as possible insures the best success with us. In our locality the onion crop was nearly ruined by a severe wind and sand storm, which cut and tore out the tender plants and roots. It being too late to replant, we had a very small crop.

The tomato crop, as far as earliness is concerned, was a failure on account of hard rains at time of first blossoming; yet later they came on with perfect success and were remarkably fine, as late as we ever handled them. The late summer rains were a special help to cabbage and celery, plainly showing the natural wants of celery for its perfections. Hubbard squash, with us, were good as we could wish, and kept well, as the carload we shipped on Jan. 5 to Minneapolis proves. From what I can learn about apples in this county, the yield was good, but smaller than usual fruits. It was below par in quality and quantity, as a general thing, and I suppose the cold, wet weather we had in May was one cause.

CELERY ON THE PRAIRIE.

BY SIDNEY CORP, HAMMOND.

In reading the last annual report I found there had been a question raised whether or not celery could be raised on high prairie land. My experience is that it can be. Although we may not be able to compete with Kalamazoo, we can raise a plenty of good celery for home use. I will send to the meeting a root of celery, such as I raised on dry grub prairie, and will give my mode of raising it. I sow the seed in a box in the house, about the first of March, and when the seed is up, keep it in the sun as much as possible, and if it is very thick, I thin it out so that it won't crowd and get spindling, and as soon as the ground is in good order for planting in the spring, I make a bed and set out as many plants as I want in it at about six inches apart each way, and let them grow in this

bed until good, strong, stocky plants, from four to six inches high. Then I prepare my trenches as follows:—Dig two spadings wide, and one deep, and throw the dirt equally on each side of the trench, then put a good wheelbarrow full of good rotten manure to every rod in length of trench. then commence at one end, and dig another spading deeper, but not throw out the dirt, but mix it well, with manure, then with a trowel lift the plants from the bed, disturbing the roots as little as possible, and set them in the trench one foot apart, and let them grow until the stalks are long enough, when straighten up to admit of leveling in the ground and not covering the heart of the plant; then gather all the leaves together in one hand, and haul the dirt in around the plant with the other. Once or twice more through the fall, pull the dirt around the plants keeping it as high as possible, and not cover the heart. Let it stand out as late in the fall as possible and not get frozen, as frosty nights will not hurt it. There are so many ways of storing it in the winter that I presume there are better ways than mine. My way is to dig it up, leaving a good bunch of dirt on the roots, and take it to the cellar where I have some half barrel tubs which I fill with roots, placing them as close as possible together. When the tub is full I pour in as much water as will just cover the roots, not allowing it to touch the stalk, and in the winter, if it becomes dry, put in more water. Be careful to dig it when there is no dew on the leaves.

DISCUSSION.

Pres. Elliot: I am no celery grower, still I have had my eyes open, and those who have had the best success are the growers who are on those drained marshes. I made a statement last year in regard to a German farmer west of the city here. He uses the bottom of a lake that has been drained. He plowed it up and manured it about forty loads to the acre, and that ground will keep moist right through the dry season. Now we have any amount of such land all over the state, and it is the same kind of land they use at Kalamazoo where they grow so much celery.

Dr. Frisselle: We want to remember that celery is a native of the marshes of England, and if you undertake to cultivate it on uplands you want to give it water all the time, but the correct plan for raising celery is followed at Kalamazoo. They raise it in the marsh. Take any muck marsh and give it a heavy coat of manure and you can raise plenty of celery.

Joshua Allyn: The time has come when celery is a luxury and everybody is trying to eat it. It is very hard work for everybody to grow it, but it can be grown by everybody if they have good soil. We are growing it every year, but to grow it for the market it requires to be grown on a cheap plan. This trenching is a good plan if you grow it on a small scale. The

deeper you get the roots the better. You must start your plants early, in February, if possible. When they are large enough prick them out and force them as rapidly as possible, and then be sure to set them out before the Fourth of July. If you set them out later they will somehow not take root. Celery can be grown and should be grown by everyone.

ASPARAGUS.

BY WM. LYONS, MINNEAPOLIS.

Fourteen years ago I set out my first acre of asparagus, using two-year-old plants. At the same time I planted one pound of seed in order to raise my own plants for future use. Two years later I planted three acres more. I now have four acres.

The first thing to be done by one who wishes to grow asparagus for market is to see if he has soil that is suitable. It should be a rich loam and as deep as it is possible to obtain. Asparagus will grow on almost any soil, but I do not think it would be profitable on a heavy clay soil. It does well on light, sandy soil, by the use of plenty of manure.

The next thing is to have a supply of good, strong plants, one or two years old. These can be obtained from some nurseryman, or can be grown from the seed on your own land. I prefer home-grown plants.

Asparagus seed, when sown in the spring, is very slow to germinate, and it is difficult to prevent the weeds from taking possession of the ground before the asparagus plants appear. My plan has been to soak the seed in warm water until swollen and softened, before sowing. It should be sown in long rows about fifteen inches or more apart, so as to be tended with hand cultivation. If a few radish seeds are sown with the asparagus they will come up at once and show where the rows are, so that they can be cultivated before the asparagus appears.

After soaking the seed put it into a coarse bag and bury it in the ground (where it will be warm and moist) until it begins to sprout, and then when sown it will come up immediately. Be sure and keep the plants clear of weeds through the season. To make good plants the soil must be very rich, so use plenty of manure. You will want them to be as large as possible, sow plenty of seed and then when weeding them thin out the plants to about three inches apart. During the season while your plants are growing, you should prepare the permanent bed. It is not necessary to dig out all the earth to the depth of two or three feet and fill in the bottom with all manner of trash. The land must be deeply ploughed and thoroughly pulverized. It cannot be made too rich. Asparagus is one of the grossest feeders of all vegetables in cultivation. The proper distance between the rows and between the plants in the row is a matter of dispute. Years ago the rule was, three feet between the rows and eighteen inches between the plants. This I thought too close and my four acres are set five by three feet apart. If I were to plant another bed I would set it five by five feet apart.

Make trenches with a plow not less than six inches deep, spread the roots out in their natural position, cover lightly to keep in place, then

the trenches may be filled with plow or otherwise. All that is necessary the first year is to cultivate it sufficiently to keep down the weeds.

The kind of manure and its condition when applied to an old bed are not material; fresh stable manure may be used, no matter how coarse, so long as it can be plowed under. But in preparing the ground for a new bed, fine, well-rotted manure is to be preferred. Asparagus always starts into growth very early in the spring, therefore the bed should be cultivated late in the fall, that it may dry out and be ready to work as early as possible the next spring.

For this mode of treatment winter protection is a great benefit. If there is no danger of injury to the plants from severe cold, still a heavy mulch put on before the ground freezes will keep all or nearly all the frost out of the soil, so that the plants will start very much earlier in the spring. A thick coating of fresh stable manure is the best possible mulch, and is also a good way to apply manure. The coarsest of the latter should be raked off in the spring, and the balance cultivated under.

The question whether salt is needed on an asparagus bed is by no means settled. While some claim that it is necessary and should be applied every year, others say that asparagus does not need salt any more than any other vegetable. Without undertaking to decide the question, it is certain that asparagus is not injured by the application of sufficient salt to destroy almost all other vegetation near it.

If not specially used as a fertilizer, the free use of salt on an asparagus bed is an advantage; it has a tendency to destroy insects and prevent the growth of weeds, and by attracting moisture from the atmosphere, helps to carry the bed safely through a drouth. Coarse or refuse salt may be applied every spring, and enough can be used to make the ground look white. The third year a little asparagus may be cut, but be very careful not to continue the cutting too long.

A full crop cannot be expected until the fourth or fifth year. It is a good plan, each year, when you stop cutting, to apply at that time a liberal dressing of stable manure, or other fertilizer, and cultivate it in.

The object of this is to insure a strong growth of tops and roots during the summer and fall, for the amount of the next crop depends upon the growth made this fall. The profits are just in proportion to the amount of manure used. Another mode of treatment is, to leave the tops on until spring; it answers as a mulch in protecting the bed from freezing too deep, and it is practiced by growers who cannot or do not manure or mulch during the winter. Early in the spring they are mown off and raked into heaps and burned. The cultivator and harrow are then used to make the ground level and mellow. Asparagus should always be cut a little below the surface of the ground, if for no other reason than the sharp stubs left may be out of the way. The stalks must always be cut before the heads show any signs of branching out. The lengths should range from six to ten inches. The size of the bunch must depend upon the market in which it is to be sold. I do not let anything grow up while cutting, no matter how small it may be.

I keep all cut close until I have finished cutting for the season. Then I turn a light furrow with a one-horse plow over each row, and let it go until fall, keeping out all weeds. With good treatment in the way of food, clean cultivation, and moderation in cutting, a bed may outlast a

generation. There is really no telling how long it might continue in first class condition; if ill used, however, a plantation after ten or twelve years of cutting, is liable to show signs of weakness, when it should be discarded. Many people continue to cut for too long a time, and in this as in all other cases, covetousness meets its reward. The beds must be very strong that will bear cutting after June.

If young seedlings spring up from last year's scattered seed, weed them out. There are quite a number of newer varieties, as for instance, the Palmetto, Mammoth, Moor's Cross-bred, Giant, etc. The introducers claim great things for them, but previous experience with improved varieties of asparagus leads me to not be over sanguine in regard to any of the newer kinds. Conover's Colossal we know to be good and reliable. The future will disclose what there is about the others.

DISCUSSION.

Joshua Allyn: Asparagus is a vegetable that we all ought to raise. It is one of the easiest things to grow in the world. It will last a lifetime. My plants are set one foot deep. Deep cultivation is far better than shallow. Get it down deep and give it plenty of manure, and work it in well.

M. Cutler: You want moist land rather than medium?

Joshua Allyn: I use moist ground every time.

James Taylor: Mine is on the highest ground I have got.

Pres. Elliot: I used to grow asparagus once, and I think Mr. Allyn's theory is the correct one. You want to plant deep enough so you can get in with your shovel plow, and when you get through have stakes set so you know where your rows are. In the spring you do not want to disturb it until the weeds begin to show a little, then you want to go in with your hooks, regardless of the asparagus.

J. M. Underwood: I believe for small planting it will do better without cultivation; put on plenty of manure and all you have to do is to cut it when you want it. Put boards around your bed, fill it up with manure, and you will not have to do anything more with it.

Joshua Allyn: What is practicable for the market gardener is practicable for every gardener.

Dr. Frisselle: As asparagus is a native of salt marshes I think it indicates it should have salt.

R. P. Lupton: If the plants are set three feet apart in the row will they not fill up the space between?

Pres. Elliot: They will keep on increasing and spread out. There is one point that has been overlooked in this question.

It is the proper time to begin cutting, which is three years after it is planted, not before. Those people who have made the most success out of asparagus have made it a rule not to cut any until three years after it was planted. Do not plant anything over two years old. I prefer good, strong one year old plants.

A FEW HINTS ON POTATO CULTURE AND SELECTION OF THE SOIL.

BY S. FROGNER, HERMAN.

The potato, like all robust growing vegetables, can be grown with varying success on soils of all kinds and in all conditions of fertility, but the soil best suited to it is a rich sandy loam, with good and clean cultivation and a liberal dressing of thoroughly decomposed manure. Good pasture land broken up early in the season, and plowed and harrowed the following spring, will produce a sound crop and often a very large one. Clover sod for this purpose is excellent and furnishes the soil a large amount of vegetable substance; when turned under in August it will rot by the following spring and a top dressing of good decomposed manure plowed under in the spring and well cultivated will give a large and fine crop. Wet lands produce a coarse, unpalatable potato, and one of little value even as food for cattle. Ground should never be plowed while wet or heavy, it injures the soil and does more harm than the manure can offset; the ground should be prepared as carefully and thoroughly for potatoes as for any other vegetable crop. Attention in this particular well repays the farmer.

If the soil is good but little manure is required. In highly enriched soil the plants are more liable to disease than when grown in soils that are naturally good. I plow the ground as early in the spring as it can be had in good working order, and then leave it till planting time—about two weeks later, then harrow the ground two or three times, till all the small weeds are destroyed, and the field is ready for planting. I use the trench system, three feet apart, five inches deep, plant one foot apart in the trench, covering the potatoes about three inches with a cultivator; one week later go over the field with a smoothing harrow twice and the trench will be filled and the small weeds again destroyed. When the vines are three to four inches high take the cultivator and give it a good cultivation once a week for three weeks and the field will be clean and free from weeds.

If you wish large, well-formed potatoes select medium good size tubers, cut them into four or six pieces according to size, preserving as many eyes on each as possible; you will then have strong, healthy vines and roots. If small tubers are planted whole the result in general is a quantity of small vines followed with an over proportion of small potatoes. The secret in producing a good crop of potatoes is, first, good seeds and rich soils, and good cultivation is the other.

VARIETIES.

Of late years no vegetable has been improved as much as the potato. Since the introduction in 1869 of the valuable Early Rose. New varieties

flood the market every year, all claiming either greater earliness, productiveness or finer flavor. If they keep on in the future as they have in the past, names for them will be almost exhausted. We have now over eight hundred varieties by name, that I know of, but in a few seasons they become almost unknown, and their place taken by other varieties for which greater merit is claimed. In 1872 I planted the first bushel of the Early Rose in this county, unknown to me except by the description of the introducer, but to-day every cultivator of potatoes is familiar with the Early Rose. After more than twenty years they are still very popular. They have lost some in productiveness but in quality are extra fine. With all the improvements in name we have no better early varieties to-day than the Puritan, Early Minnesota, Lee's Favorite, Early Rose, Beauty of Hebron, Sunlit Star, and Early Vermont; of intermediate and late, Rural New Yorker No. 2 (new), Green Mountain, O. K. Mammoth, Magnum Bonum, and Rural Blush. The above varieties are among the best kinds. They are hardy and robust growers, wonderfully productive, and in quality will be hard to beat.

ENTOMOLOGY.

A NEW PEST TO FRUIT TREES.

BY PROF. OTTO LUGGER, ST. ANTHONY PARK.

Mr. President, Ladies and Gentlemen:

Though expected to make some remarks in regard to insects injurious to the vegetable garden, I have prepared another paper treating of a new pest to our fruit trees and to a number of vegetables as well. After consulting with your secretary, we both reached the conclusion that it would be best to describe as soon as possible this new pest, so as to enable horticulturists and gardeners to be upon their guard, and, if possible, to prevent its introduction into regions as yet not reached.

The new pest—new in the sense that it has not been found before in Minnesota—is not an insect, nor even allied to insects, but is a true nematode worm, the *Heterodera radicicola* Müller. Some of its stages of life are illustrated upon the canvass before you. The worm itself (*Fig. 1*) occupies—for lack of space—a rather cramped position, resembling a genuine German pretzel with a handle. Extended, it would, if drawn in the same proportions, be much longer than the whole canvass. No doubt many, if not most of you, have seen closely allied animals. At a time when vinegar was made solely of apples or other fruit, and not from various mysterious sources not supplied by horticulturist or gardener, vinegar-eels could be detected, even with the unaided eye, in most of the home-made vinegar. The so-called “vinegar mother” was largely composed of such animals and their remains. In fact, these vinegar-eels were the manufacturers of the vinegar, and they perished as soon as the product of their united labor became exhausted of food suitable for their needs. It is, of course, an open question, and one rather difficult to settle, as tastes differ so greatly, which is the most appetizing vinegar, the one made by thousands and thousands of little worms, or the one made from all sorts of refuse materials.



Fig. 1.



Fig. 2.



Fig. 4.



Fig.



Fig. 6.



Fig. 3.

EXPLANATION OF PLATE.

Fig. 1. Male, sexually mature, very greatly enlarged.
Fig. 2. Galls produced upon roots of apples.
Fig. 3. Cross-section through diseased root: *a* and *b*, female; *c*, dead cysts.
Fig. 4. Mature female cyst.
Fig. 5. Anterior end of body: *a*, esophageal spear; *b*, anterior part of oesophagus.
Fig. 6. Posterior end of body: *a*, caudal appendage; *b*, spicules.
Fig. 7. Sexually immature larva making its way through cells of a potato tuber.

(All illustrations after G. F. Atkinson.)



Fig. 7.

The worms which cause such diseased conditions of plants are very small and consequently are not readily detected excepting by those possessing considerable experience with microscopic investigations. Fig. 2 represents the diseased root of the parsnip; the root of this plant was selected simply because it required less space to illustrate it than the diseased roots of apple or pear before you in the exhibition case, and also because it is a more typical specimen. You will perceive that the abnormal growths upon the root of parsnips appear as irregular, knotty enlargements, from two to ten times the normal diameter of the roots. Such knots are at first smooth, but become rough with age and crack in various ways, until decay of the tissues sets in, and they gradually disappear. As may be seen in the illustration in Fig. 2, the tap-root and the earlier lateral roots were attacked early in the season, and are partially decayed and falling to pieces. The plant in its struggle for existence sends out new roots, which in turn are attacked and deformed. There is a great variety in the forms of these knots or galls even upon the roots of the same plant. Their external form depends greatly upon the number of worms infesting them, upon their distribution in the tissues and upon the specific peculiarities of the root itself. Such abnormal growths upon the roots are usually called "root-knots." In Scotland they are called "root-ill," "thick-root," "tulip-root," and "legging." In Germany they are known as "warzelgallen."

In the earlier stages of the disease the root-galls have a considerable resemblance to the "potato-scab," but closer inspection will show that they are quite distinct; although sometimes appearing upon the very same potato. If we compare the root-galls with the so-called "club-foot" of the cabbage, we also find considerable external resemblance, but closer study will show that the root-galls before you are produced by an animal with a complete and high organization, while the "club-foot" is caused by a plant of the very lowest organization, one of the slimy moulds.

If we take a root-gall produced by the presence of nematode worms, and cut directly across it, and take a very thin shaving from the cut end, and put it upon a slip of glass under the microscope, the cause of the disease will be revealed at once. In Fig. 3 such a thin section is illustrated, very greatly magnified. The larger bodies represent two female cysts; the upper one (a) is mature, the lower one (b) is in an earlier stage of development. If the female cyst is very old the cavity is occupied by eggs in different stages of development, and by thread-like bodies, the larvae. This is indicated in Fig. 4. Eggs and larvae float in a gelatinous, granular substance, the remains of the parent worm. If the knife in making such a thin section should pass by the side of an animal without injuring it, the cavity exposed will then contain a perfect animal, quite different in form according to age or surroundings.

To study a mature female cyst we select the galls upon the roots of a plant with softer tissues, or roots which are already softened by the incipient stages of decay. Carefully breaking one we can with a little patience soon discover yellowish, irregular oval bodies, one-hundredth to one-fiftieth of an inch in diameter. With the unaided eye we can detect the head projecting as a minute point on one side, as in Fig. 4. If we magnify this minute body about 100 times we notice that a gravid female cyst is before us. The handle-like part of this gourd-shaped body is the head; the

mouth can be seen as a slender cylindrical spear broadened at the base, which ends in three short lobes. This hollow spear can be extended at the will of the animal, and is moved by a pair of muscles. The spear of a male is very similar, and is shown in Fig. 5. If this spear-like organ did not perform slight movements, the head, nor the whole animal, would even suggest the fact that a living animal was before us.

At this stage of existence the cyst contains numerous fat-globules, and consequently the body is too opaque to show clearly the determinations of the internal tubes or their connections with the the body wall. At the posterior end of the cyst may be seen oblong bodies within the tubes, or free in the body cavity; these bodies are the eggs, and the coiled tubes are the genital tubes. As it would take too much of your time, the minute details of the animal's structure will not be discussed, and only the essential parts will be mentioned.

Eggs—Immense numbers of eggs are found in the ovaries. Packed closely together they possess a compressed form; free they assume the usual oval form. Each egg contains a large nucleus and a distinct nucleolus. The mature egg is from three to four thousandths of an inch in length. If ready to hatch it contains a worm-like object, coiled up three to four times within the egg membrane. When the worm leaves the egg it throws off its skin for the first time, and is now ready to enter the battle of life. As the female remains in the cystic state and is surrounded by the tissues of the plants the young worms soon completely fill the cavity of the cyst. These young worms just born are from twelve to sixteen thousandths of an inch long and look exactly like vinegar eels. But the poor things, although so very active, are prisoners, being enclosed by prison walls composed of more or less hard plant tissues. If fortunate they are favored by cracks in these walls caused by the decay of the tissues, and they soon find means to escape; but otherwise, and not to starve, they have to actually batter a hole in the prison wall through which they can escape. Taking position with the head end against a cell-wall, the worm thrusts forward the exsertile spear, which strikes the cellulose wall forcibly, when it is drawn back and thrust out again. This process is repeated until a hole is made through the wall large enough to admit the body of the worm, through which it passes, and by successively battering down the cell-walls of the surrounding tissues it makes its way to freedom outside of the gall, or to a fresh portion of the same root. Having escaped from its confinement by one of these three courses, it immediately selects another part of the root, or a fresh young rootlet. Bringing into play its exsertile ram it forcibly gains entrance to the healthy tissues of the root. The attacked plant, not able to expel the invader, bends its energies in a vain endeavor to repair the injury to the roots. Increased development of cells takes place, and normal ones are turned from their proper position and function and become also very much enlarged. The result is the formation of a gall, an increase of tissues in the root, which supplies food and protection for hundreds of the worms, all which lessens the energies of the plant normally directed to the production of leaf and fruit.

The larva wanders for a time through the tissues of the plant and finally comes to rest. After moulting a second time it passes into a truly parasitic condition.

Omitting the transformations and structure of the male and female I will simply mention the duration of a single generation, during which time the numerous transformations take place. The worm passes through all the changes, from the development of eggs through the larval and cystic state until eggs are again developed in about one month. When we consider the number of eggs one female is capable of producing it will be seen that the worms multiply with startling rapidity.

It has been stated that these nematode worms cannot survive the cold of severe winters. This may be true or not, but with the arrival of warm winters in Minnesota this injurious worm has arrived from more southern climes, and I am afraid it has come to stay.

In Minnesota it has been found upon the roots of apple and pear trees, as specimens before you show. But the worm is a rather general feeder, and some forty species of plants are already known which are badly injured by it. Of cultivated plants the peach, grape, potato, egg-plant, tomato, cotton, okra, some varieties of peas and clover, sun-flower, water-melon, corn, cabbage, turnips, rutabaga, parsnips, lettuce, salsify, and others are to the taste of this almost omnivorous worm.

A number of remedies have been suggested, but careful experiments can only show which are of real value.

Plants which are already diseased can not be saved, as the worms are so well protected by living in the interior of the root that any direct application of vermicides will injure the plant as much, and more, than the worms. The application of bi-sulphide of carbon, kerosene emulsions, and various arsenical solutions in sufficient quantities to kill the worms, were also fatal to the plants to be protected. Alkaline fertilizers, like hard wood ashes, muriate and sulphate of potash, kainite, etc., produced a hard growth of roots less susceptible to attack.

The cheapest and best method would be to starve out the worms by a proper rotation of plants, of course selecting such plants for this purpose as are known not to be attacked. But the question arises: What plants shall we select for this purpose? Only a series of trials will enable us to name plants not susceptible to the disease. All species of annual grasses seem to be unaffected. Unclean cultivation is one of the most fruitful sources of the thorough impregnation of the soil with such worms. Plants infested should be removed and burned, and no other plants susceptible to the disease should be allowed upon the same soil, because otherwise a sufficient number of worms will always find food enough to remain in the field for a series of years. The greatest care should be exercised in planting new trees or other perennials, as the grape, and no young plants should be obtained from infested soil. Young trees and seedlings are more seriously affected, and the root-galls upon them are usually quite large and easily seen.

In Germany cultivators of the sugar beets are in the habit of trapping the worms of an allied species. In badly infested soils they grow plants very susceptible to the disease, and then gather the roots before the worms are fully developed. Such "catch plants" are destroyed with their inhabitants.

So far as I know this nematode worm is as yet not found in many orchards and nurseries in Minnesota, but it is here, and great pains should be taken to prevent its further spread.

FOOD PREPARATIONS.

CEREALS.

BY CLARA S. HAYES, ST. ANTHONY PARK.

"Cereals," preparations of the various grains, are becoming so generally used that every one should know the best method of cooking them. The cereals should be highly appreciated by those who wish to live economically and well. Their food value is quite well known as some one or more than one grows in almost every climate except the frigid, and until our means of transportation were so well perfected each was a staple article of food in its native place. They are very valuable and economical foods containing as they do all the food elements necessary for our sustenance. Rice is, however, an exception, being largely starch. The nitrogenous food is obtained from cereals at much less expense than from meat, eggs, milk, etc.

The cereals are not only an excellent food, but when rightly prepared are eaten with a relish and thoroughly enjoyed, instead of being eaten from a sense of duty. It is much better to serve cereals for supper than for breakfast as they can be much more perfectly cooked. The cooking of cereals requires little of the cook's time and attention, but if thoroughly prepared, must have a long, slow cooking, and if wanted for breakfast must often be partly cooked the evening before. It is strange that in so many homes oat meal is served morning after morning, instead of keeping on hand a number of the different cereal preparations which would give that variety which is so pleasing. We now have six or eight preparations made from wheat, almost as many from oats and corn, also a few of barley, rice and rye. Keep a small portion of these in store, and relieve the monotony of oat meal.

The cooking of rice has received much attention. The one object sought, however, being large, unbroken, separate grains. To obtain this result the rice is boiled in a large quantity of water, drained, and sometimes it is even rinsed with cold water after the water in which it is boiled is drained off. This gives the separate grain, but the flavor is not so good and it is a waste. A better way to cook rice is to wash the rice well to remove all dirt and also the loose starch. This is very important if the grains are to remain separate when cooked. After the rice is washed, change the water until it is clear, and cook in half milk and half water, using three measures of liquid for one of rice. Cook either in a farina or milk boiler, or better still in a covered pail set in a kettle of water and closely covered.

The one important thing in cooking cereals is to cook slowly for a long time, using the same utensils as in cooking rice. One level teaspoonful of salt to each quart of liquid seems to give the best flavor with all except the preparations of corn. For corn make the measure of salt a very little more generous. Put cereals to cook in boiling water and stir as little as possible. Stir up or rather lift from the bottom occasionally until you have a homogeneous mixture, then put on the cover, place in the hot water, cover closely and let it cook, not stirring any more. Do not serve cereals with milk. You can well afford to use cream, for the cereal is

such a cheap food and so little of it is required for a meal, a half pound of rolled wheat costing five cents a pound, for instance, being sufficient for six people.

The table annexed gives the amount of liquid and time required for cooking cereals. The amount of liquid varies slightly for different brands, but the variation is very small. If you wish to serve the cereal cold, use one-fourth more water.

WHEAT—

1. Pearled, 1 cup to 5 cups of water, cook 4 or 5 hours.
2. Cracked, 1 " " 4 " " " 3 " 4 "
3. Rolled, 1 " " 3 " " " 1½ to 3 "
4. Farina, 1 " " 4 of water and 4 cups of milk, cook ½ to 1 hour.
5. Farinose, 1 " " 4 " " 4 " " " ½ " 1 "

OATMEAL—

1. B-oatmeal, 1 cup to 4 cups of water, cook 3 to 6 hours.
2. C- " 1 " " 4 " " " 2½ " 4 "
3. Avena (rolled oats) 1 cup to 3 cups of water, cook 1½ to 3 hours.

CORN—

1. Coarse hominy, 1 cup to 6 cups of water, cook 5 to 10 hours.
2. Fine " 1 " " 5 " " " 3 " 5 "
3. Corn meal 1 " " 4 " " " " ½ " 2 "
4. Cerealine, 1 " " 1 " " " " ½ " 1 "

BARLEY—

1. Pearled, 1 cup to 5 cups of water, cook 4 or 5 hours.
2. Rolled, 1 " " 3 " " " 1½ " 3 "

BREAD AND CAKE MAKING.

BY MRS. O. C. GREGG, MINNEAPOLIS.

It has been requested of our committee to prepare notes on such old and new methods of making bread and cake as we think should be more widely known.

Let us first answer the question—"What is the object of bread making?" It is to prepare the crude material, flour, in such a manner that it will be palatable, nutritious and digestible.

As we take flour in our hands, fine and beautiful as it may be, it would not be attractive or scarcely satisfactory to the appetite in a most ravenous condition; and if it be not prepared so as to preserve its nutritioussness it cannot do the work assigned it in supplying the wants of these bodies of ours, which need constant rebuilding.

When we consider the various results of the bread makers of our land—the light, fluffy production of the average baker, almost deficient in substance and nutriment, and the tough, horny loaf of the poor cook or ignorant housewife, compared with the light and tender, as well as sweet and nutritious offering of the domestic amateur or professional adept, we cannot fail to see the wisdom of investigating the principles and methods of good bread making. Bread has been called "the staff of life," but it cannot be truly this unless made so as to preserve, as far as may be, the nutriment of the flour of which it is composed. In going

back to our good grandmothers, we find that their methods were better in some respects than many of those of the present time. They only allowed their bread to rise *once*, claiming that in all subsequent fermentations a decomposition takes place which makes the result less nutritious. The past generation has been full of experiments without knowledge, and the result has been a decline, with the mass of the people, in the methods of bread making. Indeed, about twenty years ago I heard a lady say—“The longer I let my bread rise the better it is.”

But scientists tell us this is not so; that good yeast, a quick fermentation, as the result of many yeast germs, and an even temperature are the essentials. Below we give two methods of bread-making; one by Mrs. Willett Hays, and one by Miss Corson. We claim the best results for Mrs. Hays' method; but the other method is sometimes convenient because quicker accomplished.

MRS. HAYS' METHOD.

The most important thing is good yeast. Not only must the minute vegetable germs in yeast be strong and vigorous, so that when introduced into the dough they develop rapidly, but they must also be sufficiently numerous to produce the requisite lightness in the dough in a comparatively short time. When poor yeast is used, or a small quantity of good yeast, too much time must elapse before the dough is light. We are unable to control conditions, as temperature, etc., for so long a time. Compressed yeast is much superior to all other kinds. To make bread with compressed yeast, pour into an *earthen* bowl one-half pint of milk and the same quantity of water. The temperature of the mixture being about 80° Farenheit add flour to make a thin batter, which will lower the temperature; then one-half teaspoonful of salt and one-half ounce of compressed yeast dissolved in a little water; stir with a *wooden* spoon, adding flour, a little at a time, until very stiff. Wash the hands, rub the dough from the spoon, turn out on a floured molding board and knead until enough flour is added so the dough does not stick to the hands or board. Butter the bowl, or grease it with some nicely flavored grease, as drippings, place the dough in it and brush with butter to prevent a crust from forming while rising. Place the floating or dairy thermometer beside the dough, cover with a cotton or linen cloth, then wrap up well with a thick woolen blanket kept for the purpose. Of course this blanket is not necessary in the summer. When the dough has doubled in size it has risen sufficiently, which will require about three hours. We get better results by having the temperature a little lower than 75° rather than higher. The yeast germ develops more rapidly at a somewhat higher temperature, but the result is not so good.

Always measure the milk and water, and do not measure the flour, if you wish to know how much bread you are making. The quantity of the flour depends altogether on its quality.

When the dough is light, make into loaves, place in greased pans and brush the loaves over with melted butter. Do not neglect this if you wish a nicely flavored, thin, crisp, prettily browned crust. Starch grains burst when heated in presence of moisture, but if heated without sufficient moisture they brown forming the crust. If a dry crust is allowed to form over the loaf while rising, a much thicker crust will be the result. At a

temperature of 75 degrees the loaves will require an hour to double in size. When the loaves have doubled in size, put in an oven hot enough so as to get the faintest brown in ten minutes. Have the heat increasing slightly. In fifteen minutes the brown is quite distinct. At about twenty minutes let the heat decrease slowly. A loaf in pans, mentioned below, will be well baked in forty-five minutes, and should be nearly browned all over, top, bottom, sides and ends. Remove from pans as soon as done, and brush the entire surface with sweet milk.

Never cover warm bread. Do not lay the loaves flat on the table, but place across the top of the bread pan or lean against a pan, exposing as nearly all the surface as possible. When the bread is cold it should be put away in a receptacle which is slightly ventilated.

The best bread pans are made of sheet iron, are three and one-half inches wide, three and one-half inches high and as long as the oven will admit. Use a pan for each loaf.

HOME-MADE YEAST.

Steep an eighth of an ounce of hops in a quart of boiling water for eight minutes. Stir one-half pint of flour to a smooth batter with one-half pint of cold water. Strain the boiling hop water into the batter, pouring slowly and stirring rapidly. Place on the stove and cook three or four minutes. Add two level tablespoonsful of sugar and one of salt. When cooled to 75 degrees add one ounce of compressed yeast or one-half pint of home-made yeast. Keep as nearly 75 degrees as possible for twenty-four hours, stirring it down once in four or five hours. This yeast keeps well; better than when potatoes are used. A glass fruit jar is the best receptacle for the yeast. The jar should be thoroughly washed, scalded and aired before a new supply of yeast is put in.

How to Use Home-made Yeast.—Home-made yeast is not so strong—does not contain so great a per cent. of yeast germs—as the compressed yeast. To make bread with home-made yeast, begin at bedtime. Pour one pint of boiling water slowly on three tablespoons of flour, stirred to a smooth batter with a little cold water. When cooled to 75°, add one-half pint of home-made yeast and cover well with a woolen blanket till morning. If too cold in the morning, warm by placing the bowl in a pan of warm water, stirring until the right temperature is reached; add one pint of milk at 75° and mix the bread same as when compressed yeast is used. The small amount of flour used in setting the ferment is sufficient for the growth of the yeast, and as the only object in making the ferment is to have an abundance of yeast germs to introduce into the dough, that it may rise rapidly, it is better, for several reasons, to use only a small quantity of flour.

It is advisable to leave the milk out of the ferment and add it at mixing time, as there is then no danger of sour bread, caused by lactic acid. If potatoes are used, they should be put in at mixing time also. Potato bread has a different texture, but not so fine a flavor as bread made without potato. Neither is the bread as well balanced a food as when the potato is left out, as the potato increases the proportion of starch to muscle-formers. Potatoes should be used in bread when flour is deficient in starch, or has starch of poor quality, as in case of flour made from frosted or blighted wheat. For the same reason, sugar should not be used in bread.

HOW TO MAKE BROWN BREAD—Place in a bowl one-half cup of molasses, one and a half cups of sour milk, one scant teaspoon of salt, one cup of graham flour, one and a half cups of corn meal in which is stirred one and a half teaspoonfuls of soda; stir until well mixed. Pour into a well buttered double boiler, keep water in lower part boiling, and cook four or five hours. A small tin pail with a closely fitting cover placed in a kettle of boiling water, which is also covered, may be substituted for the double boiler.

Another method. Sweet milk and baking powder may be used instead of sour milk and soda. Raisins or other fruit may be put in the brown bread as the butter is poured in, putting a layer of butter, then a layer of fruit, then another layer of butter and so on.

Miss Corson's Receipt for Bread.—For two loaves of bread or a large pan of biscuit use a whole cake of compressed yeast. Dissolve the yeast in one cup of lukewarm water, add enough flour to form a thick batter, about a cupful of flour, cover the bowl with a towel folded several times to retain the heat and set it near the fire in a place not too hot to bear your hand, until the bottom is light and foamy. After the sponge is light, mix in another cupful of lukewarm water in which a teaspoonful of salt has been dissolved and add flour to form dough stiff enough to knead with with the hand. Knead the dough on the board just five minutes. Some good housewives would declare that just five minutes kneading is flying in the face of Providence in the way of bread making; but I assure you, it is enough to give the bread a firm, fine grain, perfectly even in its consistency. After kneading it, make it up in loaves and put in buttered iron pans and place by the fire where you can bear your hand, and let them remain until they are twice as large as when you put them down. Brush them over the tops with a little melted butter or with a teaspoonful of sugar dissolved in water and put them in the oven to bake. Let them remain until you can run a sharp knife or trussing needle in through the thickest part of the loaf, without the bread sticking in any way to it. It may take from half an hour to an hour, though some times it may be done in a still shorter time. The sooner it can bake without burning, the better. It is not necessary to knead bread more than once to secure lightness. The longer you prolong the process of bread making the more of the nourishment of the flour you destroy.

HINTS ON CAKE MAKING.—Have everything at hand before commencing work, even to cake tins. Pans are better greased with lard. Line bottom of pans with several thicknesses of paper, if the cake is large, and grease the top one well. In some ovens the sides should be lined also. If butter is very salt, cut into small pieces and freshen a little; if hard, warm, but do not let it melt. Use pulverized sugar for delicate cakes; for rich cakes, coffee sugar, crushed, powdered and sifted; for dark cakes, best brown sugar; for jelly cakes and light fruit cakes, granulated and "Coffee A" are best.

Beat yolks thoroughly and strain; set the whites away in a cool place until ready for them, then beat them in a cool room, till they will remain in the dish when turned upside down. In warm weather place eggs in cold water for a few minutes, as they will then make a finer froth; but be sure they are fresh or any amount of beating will not insure a fine froth. Beat butter and sugar to a cream; then add part of milk and part of flour

alternately in small quantities; then yolks of eggs, then whites (beaten), and flour in small quantities, and lastly, flavoring. The baking powder should be mixed with a cup or more of the flour and added with the whites. Never beat cake in tin or with an iron spoon, as they would turn it dark.

Powdered sugar may be sifted on the top of any cake while it is a little warm. If it dissolves add more when it is cold. Keep some for this purpose in a spice box with perforated top. The white portion of lemon or orange peel should never be used; grate only the yellow portion of the rind.

When recipes call for soda and cream tartar, baking powder may be used instead, by taking the same quantity as required of both.

Milk should always mean sweet milk; any cup means a tea cup not a coffee cup. One-third of a cup of molasses instead of a wineglass of brandy in cake gives good results with the added satisfaction of cooking on strictly temperance principles. For those who object to the use of liquors in any way and who prefer not to keep them in the house, the above will be found an excellent and cheap substitute. Raisins should not be washed as it is difficult to dry them—rub them in a coarse towel and then look them over carefully. They should be prepared before the cake, and added the last thing before putting in the oven, or, being heavy, they will sink to the bottom. Do not chop raisins too fine; if for light fruit cake seed-ing is all that is necessary. Slice citron thin and do not have the pieces too large as they will cause the cake to break apart when cutting. Prepare currants for use as follows: Wash in tepid water in a colander set in a pan, rubbing well, changing water until clear. Pick out bad ones and dry in a cool oven or in the "heater."

The batter for fruit cake should be quite stiff. When using a milk pan or pans without stems, a glass bottle, filled with shot to give it weight, greased, may be placed in the centre of the pan. All except layer cakes should be covered with a paper cap or a sheet of brown paper (saved from the grocer's packages) when first put in the oven. Take a square of brown paper large enough to cover the cake pan, cut off the corners and lay a little plait on four sides, fasten with pins so as to fit the pan and throw it up in the centre.

Care should be given to the preparation of the oven, which is oftener too hot than too cool; still too cool an oven will ruin any cake. Cake should rise and begin to bake before browning much. The good quality of all delicate cake depends upon its being made with fresh eggs.

The above is gleaned mostly from the Buckeye Cook Book.

EXPERIMENT STATIONS.

REPORT FROM CENTRAL EXPERIMENT STATION (HORTICULTURAL DEPARTMENT.)

BY SAMUEL B. GREEN, SUPERINTENDENT.

The past year has been one of marked progress in this department, and the outlook is very bright for more helpful work in the future.

I have been and am on the outlook for aids to advance the efficiency of our experiment work. Features which I think could easily be introduced, and would result in increased helpfulness to the work, may be outlined as follows:

1st. Cut down the experiment stations of the horticultural society to not over seven in number, and let these be carried on by parties who will make an annual report to the horticultural society and to the central experiment station.

2nd. Make these experiment stations sub-stations under the horticultural department of the central station.

3rd. These stations to be supplied, free of cost and transportation, with material for experiments through the central station. This shall consist of any suitable surplus material propagated by the central and the Owatonna and other stations, and such other material as may be bought by the central station for this purpose.

4th. The superintendents of all the sub-stations of the horticultural society shall make reports, and have their railroad fares paid to the annual meeting of the horticultural society by the society, providing they attend the same.

5th. The work of each sub-station shall be defined by the executive committee of the horticultural society.

6th. Any superintendent of sub-station failing, for two consecutive years, to make a report as required above, shall be discontinued. I think the introduction of some such plan as this would result in greater usefulness for the experiment stations and aid much in the development of our horticultural interests.

NOTE.—It is probable that the efficiency of the work of the several stations will be increased if their work is not too much scattered, but is rather specialized.

BURNING OF EXPERIMENTAL STATION BUILDING.

By the burning of our office building October last, the regular work of the station staff has been quite seriously interfered with. Some of the members lost valuable records and collections. A new building has been commenced and is now near completion, which will give the chemical department of both school and experiment station most excellent quarters, while a building is contemplated to be put up the coming summer which will furnish much better facilities to all members of the station staff than those occupied heretofore.

FREE DISTRIBUTION OF PLANTS &c.

Thirty packages of desirable plants have been distributed the past year to various parties interested in the advancement of horticultural science.

Most of the material came from our station nursery; some was bought for the purpose and the Owatonna experiment station contributed Green-

wood crab and Dartt's hybrid apples. We are collecting quite an amount of material with the purpose in view of distributing it from time to time as it becomes large enough for the purpose. It is not our intention to distribute to all who ask, but to send to experiment stations first and to supply the remainder to intelligent careful growers as may be recommended.

RUSSIAN APPLE ORCHARD.

Although this orchard is in an exposed place, not at all adapted for successful orchard growing, yet the trees have made a vigorous growth and are exceedingly promising and free from blight. In pruning these trees it has been my aim to encourage low branching and especially the growth of limbs on the southerly half of the trunk.

Further than this and the removing of interlocking branches, I have gone on the principle that the less pruning done the better. On the land between the trees I have grown Hubbard squash, which is one of the finest crops to grow in an orchard as well as a profitable one.

Some trees of Koursk Anis and Summer Calville, that have been set six years, gave a little fruit. Most of the older trees give promise of fruit for next year. The following varieties have been added to the list the past year: Okabena, Northwestern, Greening, Thompson Seedlings, Greenwood Crab, Brackett's Seedling Pear, Gokonsha Pear. In our nursery orchard, which is set mostly with well known varieties, we have had an abundant yield of Wealthy, Tetofsky, Beech's Sweet, Orange Crab, Pearce's Crab, Strawberry Crab, and a small yield of Duchess, Grant, Swaars and Whitney.

In the immediate vicinity of the state farm the Pride of Minneapolis crab is gaining very much in favor as a reliable and heavy bearer. I have also most excellent reports from other localities in the state. I think it might often be planted to advantage. It is, as you all know, an early winter apple.

THE NEW ORCHARD LOCATION.

We have cleared off the timber (mostly oak), from about two acres of land on the north side of the hill on the state farm, and expect to have the land fitted and planted out to apple trees the coming spring. This will give us a location for an experiment orchard that is very favorable for such purposes, and will supplement our present orchards. The tillable soil is about eighteen inches deep and overlays a gravelly subsoil, containing some clay.

PLUMS.

The crop of plums borne on our De Soto trees was something astonishing. I wish that every farmer in the state could have seen them. These trees commenced to bear three years ago, and have borne heavy crops every year since. The Forest Garden and Weaver have yielded good crops. The Rollingstone has not done as well on our grounds as I had expected. On the ground of Mr. O. M. Lord, of Minnesota City, it produces the finest native plums I have seen, but with us they do not bear so abundantly as others, and the fruit is much more injured by the work of the curculio.

Several new varieties of plums have been received on trial, besides which we have seedlings of our own, and have sown the past fall about one bushel of seeds from select varieties.

GRAPES.

Our crop of grapes has been a fairly good one. The most productive varieties with us the past season were Worden, Brighton, Lady, Moore's Early, Janesville, Early Victor, Delaware, Agawam, Lindley, Herbert and Barry. In our location the Concord has not ripened for three years, and I therefore would not recommend it for general planting, but only for favorable locations. We have discarded Goethe and Niagara as requiring too long a season, though we expect to try them both, the coming year, on weak stocks, to advance, if possible, their period of ripening.

GRAFTING THE GRAPE.

In some experiments carried on in this line the past season excellent results were obtained in grafting before the sap had started at all, i. e., in what is called the first period. Other vines were successfully grafted after the plants were in flower, but the growth on these was not over three feet, while on those grafted earlier the growth was generally over ten feet. These results were obtained in grafting various Labrusca on the Clinton. These matters I anticipate reporting on at more length in a coming bulletin.

CHERRIES.

The cherries received from Prof. Budd in 1889, fifteen varieties, wintered well and made a very satisfactory growth the past season. They are now heeled in and will be planted permanently the coming spring on high, dry ground.

The trouble in getting hardy stocks presents itself to all growers of this fruit. The sand cherry I think will make a reasonably good stock for this purpose. I have also imported from Riga this year four and a half pounds of cherry pits, which I hope will furnish us with valuable hardy stocks.

SAND CHERRY.

The many conflicting reports about this fruit I think can be reconciled by believing that there is a great difference in the varieties. It is certain that this fruit was in great abundance near Brookings, S. Dak., the past season and at other places; that it is a reliable crop in some of the most trying localities in Dakota and is looked upon already as a commercial commodity. I obtained some of these fruitful plants several years ago from various localities and planted some on dry poor land and others in rich garden soil. The past year a variety received from Prof. Budd several years ago, blossomed full, but only fruited sparingly.

STRAWBERRIES.

Our crop of strawberries was a very late one and fruited sparingly. I have little to add to the paper presented to you on this subject last year except to say that Park Beauty is a promising variety and deserves a place on our fruit list as a most promising novelty, it is also highly praised in many localities elsewhere.

Lady Rusk is quite a failure on our grounds, having become badly diseased; this is much the same report that is made of it elsewhere generally.

Warfield No. 2 is a prolific variety and very promising, but we have not sufficiently tested it to be ready for a final report.

Last spring we planted all the novelties of the season, including Parker Earle, Osceola, Bedawood, Crawford, Michael's Early, Cloud Seedling, etc. These have all made a satisfactory growth.

SEEDLING STRAWBERRIES.

The last season we fruited over forty of our seedling strawberries but not one do I consider worth retaining..

CURRENTS AND GOOSEBERRIES.

These have borne good crops the past season. Some experiments tried in covering gooseberries convince me that the increase of vigor and certainty of crop secured thereby will repay any additional cost necessary in laying them down

The Industry gooseberry has fruited the past year at the station, the fruit is very large and of good quality, but I have yet to see the plant grow with sufficient vigor to ever make it profitable. It should be protected in winter.

RASPBERRIES.

There is nothing new in raspberries that I think an addition to the list. The Cuthbert is holding its own and the Marlboro is growing in favor. Mr. Stubbs, of Long Lake, sold last season \$125 worth of them from one quarter of an acre.

The *Golden Queen* is a prolific variety much like Cuthbert in form, but as its canes are much stiffer than those of the Caroline, which is also a yellow variety, the latter would be my choice for garden purposes on account of the readiness with which it may be laid down and covered. It is more prolific than the *Golden Queen* but not so firm or of so large a size.

RASPBERRY SEEDLINGS.

We have about 2,000 seedlings from the Cuthbert and Schaeffer's Colossal which ought to fruit next year. As most of these are from the Schaeffer, which is a hybrid, I regard them with much interest.

VEGETABLES.

The experiments in this line will be reported on in a later bulletin. I wish to say, however, that of the eight hundred potato seedlings grown from seed sown at the station two years ago, all but fifty of the most promising have been discarded.

FORESTRY.

This is a subject of vast importance and I wish it was within the means of the society to give it more attention. I have put out a plantation of two and a half acres the past year with a view to testing our Russian willows and poplars as forest trees. At the same time most of our native timber trees, both deciduous and evergreen, were planted in the same tract. Besides furnishing valuable data for experiment purposes, it will serve as an important object lesson to visitors and our farm school pupils. I design carrying on some experiments in forestry physics the coming season.

CONIFERÆ FROM SEED.

This matter will be referred to at more length in a paper now prepared and shortly to be issued in a bulletin form. Our experiments were such as to serve the purpose of an important lesson in the sowing of the seeds of these valuable trees, during the past season which has been very unfavorable for this work on account of the warm, moist weather in May and June. It may be of interest to those who are watching that peculiar broad-leaved conifer commonly called Ginko tree (*Salisburia adiantifolia*) and who know of its very promising behavior in point of hardness. It may be interesting to them to know that we can grow it here readily from the seed, which is not expensive.

ARBORETUM.

Some little attention has been given this valuable feature the past year and there seems to be a feeling to regard it with increasing favor by our horticulturists generally.

I can hardly urge this matter too strongly upon your attention. The benefit to be derived from it must be far reaching in its consequences. Additions have been made to it of over 100 species and varieties the past year.

To Harvard College through its Arnold arboretum we are indebted for a fine collection from the genera *Pyrus* and *Prunus* and some others.

RUSSIAN WILLOWS AND POPLARS.

Many of these are growing in favor with our planters, and the general opinion is that they have come stay and to form a valuable acquisition to our list of trees.

A new feature which we have discovered the past year is that the beautiful trailing willow called Napoleon's willow, can be easily grafted on *Salix acutifolio*. Treated in this way it will give a very desirable novelty in ornamental trees for the lawn and something that our nurserymen and amateurs will be pleased with.

MINOR EXPERIMENTS.

Many experiments have been undertaken, an enumeration of the details of which would require much space, and so would be out of place in a report of this nature. They were as follows:

Experiments in the use of Bordeaux mixture on potatoes to check blight.

Experiments in the application of Minnesota tankage as a garden and greenhouse fertilizer.

Experiments in summer propagation of plants.

Experiments with old and new squash.

The results of these experiments will be furnished more in detail in bulletins from time to time.

Besides caring for the experiment work at the station, I have had charge of the laying out and grading of the ground about the School buildings, which has taken much care and attention.

In closing I wish to again thank the members of the society for cordial co-operation and the kindly interest manifested in the work of my department.

REPORT OF EXPERIMENT STATION.

BY CHAS. LEUDLOFF, CARVER, MINN.

For this time my report is short, as Mr. Frost on the night of May 17th shortened it very much, as my Russian apples, plum and cherries were then in bloom nicely, but all blossoms were killed by that frost; the Russian apples in my experimental nursery did well last summer; they were all free from blight and made a good growth. In my orchard some kind of crabs blighted very much and a few died down to the grouud. My grapes also were damaged by frost and only a few baskets full of bunches was the crop; strawberries only are picking; some of my plums (best native) brought a good crop. The currants and gooseberries gave me a

full crop. Blackberries were killed the blossom) by frost. The Russian pears gave me a good show for a crop for next year; also the Russian plum looks good for a crop, but right here I have to mention that the Russian plum will not live long enough if top grafted on our native plum stock as the cells don't fit, so they unite, not well, the graft growing thicker; I think they will do better by root graft with long scions, so that the scions may produce later trees or roots. Later in the fall I planted some large plum trees (top grafted with our best natives) and on them I found on the roots two inches below the surface a worm like the apple borer about one inch long, $\frac{1}{2}$ inch thick, cream white, with a brown hat. This worm was boring two to three inches long and $\frac{1}{2}$ inch wide, deep into the bark. After this bad show I went to my two year old plum trees (roots grafted), by examination I found there the same worm as above stated only smaller, though it was always on the grafting place. The damage was not great at present, but I think this worm will do more damage when he gets larger. The frost did not allow me to look all over my plum trees for this pest, so a further examination must be made next spring.

REPORT FROM NEW ULM EXPERIMENT STATION.

By C. W. H. HEIDEMAN, SUPT.

For the past ten years the writer has devoted some considerable time in experimentation with the native wild fruits found so abundantly in this vicinity along the Cottonwood and Minnesota river valleys, taking them from their native habitat, and submitting them to improved care and cultivation, and raising hundreds of seedlings with a view of ultimate improvement. My grounds now contain representatives of all the native fruits of this vicinity, together with varieties from Dakota and Montana; also many of the standard cultivated fruits adapted to cold climates. The reports which I have to offer are based on actual observation here, covering a period of several years, and not from catalogue claims or descriptions. As this is my first report, I am afraid the failures of the past ten years, if recorded would receive more prominence than the successes, because of inexperience and an uncontrollable desire to test everything new that is offered.

The past season has been unusually favorable for all kinds of fruits. Native fruits were especially abundant.

The experimentation undertaken at this station is mostly the raising of seedlings, at first by selection, and only undertaken with a definite plan of procedure within the last few years, consequently many of them cannot be reported upon for several years. The improvement of our native plums has been, and will continue to be, my special work.

PLUMS.

I know of no fruits adapted to our climate which give greater promise of general success than our *Prunus Americanus*. When we take into consideration the origin of such fruits as the apple, pear, peach, grape, etc., etc., and the many years devoted to their improvement, it is surprising that so few attempts have been made towards the improvement of a fruit so generally distributed and capable of withstanding the severest climates. Nature unaided has almost alone accomplished the high state of

perfection in this fruit, that has required years of careful and patient work of pomologists with our other standard fruits. So far as is known the only improvement as yet has been by selection, and the average list of our northwestern nurserymen contain generally less than half a dozen varieties. An examination of the geological and natural history survey of Minnesota shows that *Prunus Americana* is found indigenous in 72 out of 80 counties of the state and probably in all of them.

Carver, who traveled to the upper part of the Minnesota river in 1767, wrote of the region through which it flows: "Every part is filled with trees bending under their loads of fruits, such as plums, grapes and apples."

I have now over 60 distinct varieties including Chicasaws, Russians and my own importation of a dozen varieties from North Bohemia, most of them not yet in bearing. My collection of Americana varieties includes almost everything which has been catalogued, together with many which have as yet not been generally introduced and have only a local reputation. Among them we have several varieties which are superior to such varieties as Weaver, Forest Garden, &c., &c., in many respects. None of the Chicasaw varieties tested are hardy enough to be perfect at this station. The foreign plums have not been tested long enough to give an opinion as to chances of success; about all we can expect of them is to furnish pollen for use in pollinating our best known hardy varieties for hybrids.

APPLES.

My experience has been almost entirely with Michigan apples in barrels and this year even that is limited. The few trees we had of Duchess, Transcendent and Brier Sweet, all succumbed with blight, the past season. In the spring of 1888 I received a collection of Russians from Prof Porter, most of them cripples. Three trees are still alive and, in good condition, apparently perfectly hardy. The varieties are 149M, Babuschino, and Champagne Pipka. The others all succumbed to blight the first and second season. Trees of 12 varieties of North Bohemian apples and the same number of pears have been received and will be planted in spring, also seeds of selected varieties from the same source.

DEW-BERRY.

For over six years I have anxiously waited for fruit from the variety called Lucretia, having tried it on various soils, and tried plants procured from different sources. It has bloomed freely but has given but little, and that very imperfect fruit; the blossoms seem to be deficient in pollen. It is barely hardy enough for this climate even with winter protection. At the same time I have had better success with the native dew-berry picked up here which is perfectly hardy without covering, fairly prolific, with very large fruit of good quality.

DWARF JUNEBERRY.

This shrub has received a great deal of puffing as a very desirable fruit and a subject for improvement. From observation of the Juneberry here in its native home, and under cultivation, I am convinced that it will never be profitable as a fruit for home use, much less for market. I have searched through acres of the bushes without finding enough fruit to test for cooking. The fruit ripens very unevenly and is then generally claimed by the birds. I do not, however, wish to detract anything from its merits as an ornamental shrub. The taller growing varieties especially, make

a very fine lawn tree with dark, glossy, healthy foliage resembling the pear. Have received plants from Montana where I have seen it in fruit fairly prolific and of good size.

RASPBERRY.

We are having good success with the Turner, Caroline, Hansell, Cuthbert and Philadelphia Red, without any winter protection whatever. Preference is given in the order named. Black cap varieties have not been a success, except a native black cap, which shows great improvement in size and productiveness under garden culture.

BLACKBERRY.

Have but one variety, the Snyder, which has fruited two seasons. Has received no winter protection.

CURRENTS.

We have several old varieties which furnish an abundance of fruit. Seedlings of the native black currant show marked improvement in size and quality and productiveness the first generation from the wild.

MISCELLANEOUS.

We have quite a number of seedlings of the wild black cherry, choke cherry, bird cherry, sand cherry, buffalo berry, etc., etc. Some of them promise improvement over their wild congeners.

REMARKS.

President Elliott: In Mr. Heideman's report I notice he says there is a marked improvement in the native black currant from the seedling, and if this is so it seems to me that we had better continue in that direction. If we could get the black currant to grow as prolific as our red currant it would be valuable.

OWATONNA EXPERIMENTAL TREE STATION.

BY SUPT. E. H. S. DARTT.

To the Minnesota State Horticultural Society:

GENTLEMEN: All is quiet on the Potomac, is what we used to hear when our armies were maneuvering and anxiously waiting to meet our nation's insidious foe. And we may say all is quiet on the Owatonna tree station while we are working and waiting for the onslaught of our insidious foe the elements. We court a moderate degree of early disaster that our works may be tested and strengthened, so as to avert future calamities.

Much substantial work has been done during the last season, the details of which will be omitted except so far as may seem necessary to enable you to judge of its character.

It has been my belief that good results would be obtained much sooner by gathering in the first fruits of other men's labor than by depending entirely upon my own. I have also anticipated grand results from planting the seeds of our most valuable acclimated varieties.

These two lines will be pushed in the future as in the past. In regard

to forest and ornamental trees we have thought it best to test all varieties represented hardy at Bloomington, Ill., and some other imported varieties of which little is known as to adaptation. This will certainly bring a great many failures and implies a very long black list. Most men and some states are sensitive about admitting a great preponderance of failures. When the name of magnolia is read on the black list some may say any fool ought to know better than to try to grow the magnolia in Minnesota. But how do we know that magnolia *acuminate*, the hardest among them, will not thrive here under favorable conditions. How do we know that dwarf peaches, pears, cherries and apricots may not be profitably grown by covering in winter? If planted on a hill side they could be trained near the ground which would greatly facilitate covering. A hint from you as to the width of the field that I should try to cover or in regard to any other matter will be thankfully received.

As a rule all trees have done well in the nursery. But very little blight appeared and was confined to half a dozen varieties of Russian apples and a few seedling crabs.

INSECTS.

As a protection against drouth the ground was heavily manured. Among nursery rows it could not be plowed under and cut worms became very numerous and destroyed nearly all of the seasons planting of seeds and some that were grown the previous season. I tried hard to save the pedigree seeds by hunting out and crushing the worms. But they hid while I worked and worked while I slept, and came out ahead. Under a bunch of green branches carelessly thrown down covering less than a square foot 90 cut worms were counted. Such branches were immediately placed along the seed rows and many worms were destroyed, and I have reasons to think that had this plan been resorted to at first, most of the damage might have been prevented.

A willow worm appeared later in the season. It was black, about an inch in length when full grown, and had ten yellow spots on each side. It took the leaves clean as far as it went; but was quickly destroyed by an application of paris green mixed with land plaster for potato bugs.

The vine sphinx became numerous on Virginia creeper but yielded to the potato bug mixture.

Four thousand root grafts were planted last spring, comprising 190 varieties, of which 56 were Russian and the remainder seedlings, some of which originated on the ground, others being contributions from propagators of Minnesota and adjoining states. An average stand and fair growth has been secured. The ground was kept clean till August 10th when oats were sown for winter protection and covered the ground completely, at the approach of winter. Piece roots four inches long were used. I have tried long scions on two inch roots but did not get a good stand. Have tried all grown or top pieces of root by the side of all second cuts with no perceptible difference. Many believe that the stock exerts a powerful influence over the scion. My experience is the other way. Give me the right scion and I care little for the stock, provided it is hardy and furnishes plenty of moisture. Will set about 150 varieties of apples and crabs next spring, 20 varieties of Russians, and of the remainder many will be new from noted originators.

NURSERY STAKES.

Fifty stakes have been painted with wax, 300 have been soaked in a solu-

tion of sulphate of copper and a few in lime water to test durability. Iron stakes made of No. 4 wire will be tried in the spring. One thousand six hundred and fifty Evergreen trees were planted as follows: 500 Scotch pine, 500 Norway spruce, 500 white spruce, 100 red pine, 50 pieca cornicolor. Fully 95 per cent. are alive.

The orchard now contains 400 trees, 55 of Russian varieties, 20 of seedlings and crabs, 12 of plums, 3 of pears, and 1 of cherries. At least 120 trees will be added each year and in these additions, seedling varieties will predominate.

Trees are 15 feet apart east and west, and 10 feet apart north and south. Every eleventh row running east and west, being of evergreen trees.

I regard sixteen feet each way, as a suitable distance for such trees as Duchess, while Transcendent crab, if it does not blight will crowd in 20 years at 20 feet each way.

One object in close planting here, has been to test a large number of varieties without covering too much space. Boards six inches wide have been placed on the southwest side of more than 100 orchard trees to prevent sun scald. One hundred and twenty-five shade and ornamental trees were planted about the school grounds last spring; and though most of them are alive, yet I regret to say, that the situation is much exposed to sweeping winds, and the growth of trees has not been satisfactory. A strong windbreak on the south and west is greatly needed.

Fall planting will be tried. Several varieties were transplanted last fall for that purpose.

The Alpine bearberry of the heath family, from Wisconsin woods, may have real merits as an ornamental shrub. It bore shining black berries, size of blue berries, the second year, in great profusion. The fruit, as the name indicates, is good for the bears, but good for nothing else unless it may have medicinal properties or do for the ugly sparrows when they become numerous.

I have met with frequent failures in growing trees from seed, and I attribute it largely to want of sufficient moisture in the ground, at and soon after the time of germination. I have left a portion of this year's appropriation unexpended, and will add enough from that of next year to dig a well or obtain water by piping from the deep well of the State Public School.

I am under great obligations to the members of our society and to horticulturists generally, for kindness and material assistance in the work I am trying to do.

DISCUSSION.

Wm. Somerville: Mr. President, I want to say in regard to Mr. Dartt's experiment station, that I was at his place and he took a great deal of pains to show me around, and it was the most gratifying sight I have seen for years. He takes so much pains that he can show you every seed he has planted and of what quality it is, and he keeps everything in such good order. I am expecting right from Mr. Dartt to get the coming apple for Minnesota, even ahead of our Russian and Peerless.

J. S. Harris: I was sent to his place to look it over, and I had access to his books, and he took me through the station and private office and he has everything in apple pie order. His books show a good system, and I believe he is the right man in the right place, and he ought to have salary enough to enable him to enlarge the work and carry it on to its final end.

L. H. Wilcox: I would like to ask Mr. Dartt in reference to what he says of cutworms, whether he considers that heavy manuring produces an extra heavy crop of cutworms?

E. H. S. Dartt: That is my impression.

Pres. Elliot: If manuring facilitates the production of cutworms I hope you will all adopt his method of catching them by laying a leaf or anything green on the ground so they can crawl under the shade. I have used that very effectively in my garden and I cannot catch my cutworms in any other way.

L. H. Wilcox: Has anyone ever tried Paris Green?

R. P. Lupton: I have not, but somebody told me a year ago that if I sowed some salt on my ground it would kill cutworms. I am willing to try almost anything, so I tried that. I tried it in my melon patch, and I came to the conclusion it was the best thing to raise cutworms I ever tried. I was determined I would not be beaten, so I took tarred paper and cut it into strips about twelve inches long and three inches wide. I then went all over my melon patch to find the worms. After I got through I took those bits of tarred paper and put them right down around the hills, sticking them in the ground about one-half their width, and that is the way I saved my melon patch. I did not lose one plant out of fifty.

Geo. J. Kellogg: I have been looking over friend Dartt's list of apple trees to find his best varieties, and he has only three, one the Duchess of Oldenburg. Here are two more pages of varieties, and where is the coming apple?

Prof. Green: He has just told us he did not know what it was yet.

E. H. S. Dartt: Now that list is a large one, and most of those varieties we know nothing about, how then could I pick out and say which was the best? But those that I have marked I do know something about. I expect the coming apple may be in one of those forty-four varieties that I have entered "A" to "M", and from "AA" to "AQ". There are forty-four varieties of seedlings that I have grafted and marked and it may be in that list.

REPORT OF EXPERIMENT STATION AT MINNESOTA CITY.

BY O. M. LORD.

Received, last spring, from Mr. Kramer, La Crescent, a sample of Princess strawberry plants for testing. The plants have made a good growth, but have not multiplied largely. Received from our State Station pear trees, Early Harvest blackberry, also some poplars and willows.

From A. W. Sias, Rochester, six varieties of apple trees, and from the Iowa Agricultural College three varieties of plums. From J. S. Harris, La Crescent, three varieties of apple trees. Plum scions received from several parties, all failed to grow. Also quite a quantity of seed failed. Among the fruits produced this year for the first, were the Spear, Wolf, Hawkeye, Forest Rose, and several seedling plums. Of apples, the Walbridge, White Transparent, Golden Russet, Fulton and Shockley. The last named and some others were planted as an experiment to test in some degree the theory in regard to acclimating trees. If trees of tender character can be acclimated to withstand severe cold, the process is at best a very slow one.

The Haas apple is supposed to have originated in South Carolina, and has proved as hardy in this vicinity as any of the old standard kinds. The Shockley originated in Georgia, a description of which may be found in Agricultural Department Report, 1869. The tree appears to stand the climate as well as several other kinds that have formerly produced good crops here. Some trees from northern Alabama have borne several good crops in this vicinity, which would indicate that the ability to stand the climate depends upon the character or habit of the tree in maturing its new growth before cold weather. Much stress was at one time laid upon the necessity for trees to shed their leaves and go into winter quarters early, and upon that habit was based their capacity to withstand the cold. That this is not true is shown by the Wealthy, which is the very last among a large number to shed its leaves, and to reason by analogy our very hardest oaks frequently retain their leaves all winter.

If, however, the leaves of fruit trees at the advent of winter are green and the new growth succulent, they perish of course.

REPORT FROM EXPERIMENT STATION OF LA CRESCENT, MINN.

BY J. S. HARRIS, SUPERINTENDENT.

A number of the newer varieties of Russian apple trees procured from J. L. Budd, of Ames, Iowa, a few years since, blossomed in 1890 for the first time, and a few of them carried fruit to maturity. Of the number is 1st, Antonovka; fruit, above medium in size; form, flat, conic, somewhat ribbed; color, a greenish yellow in shade, and a brownish yellow in the sun; the stem is short, set in a yellow, russety cavity; calyx, half open; basin, deep ribbed; core, half open; flesh, pale yellow, firm; flavor, pleasant acid. The season this year was November; would probably keep longer if picked early. The trees are on deep, rich, cooley soil and appear vigorous and healthy, showed but little blight.

2d. No. 1227, Gipsy Girl: fruit, medium, round, mostly bright red, a

beautiful fall apple just later than the Duchess; the tree is a thrifty, fine grower but blighted considerable last season.

3d. Roursk's Anis: a little under medium in size and in quality one of the best of the Anis family; the tree is a close topped, moderate grower, and appears hardy and free from blight.

4th. Vargulek, size medium, form flat, conical, color greenish yellow with a reddish cheek, a short stem, flavor acid, season about December, trees vigorous growers but blighted considerably.

The station orchard is doing well and did not suffer very much from blight. The Warfield No. 2 strawberry fruited with us this season and promises to be as productive as the Crescent, the fruit is handsomer and much firmer, and to our taste of better quality. The Jessie is not proving satisfactory except as a fertilizer for pistilate varieties. We have now on trial in orchard, besides what has been previously reported, the Catharine, (plum No. 1.) A number of seedlings that originated in Wisconsin, and about 30 additional varieties of the new Russians, and the Scott's Winter, besides seedlings of our own growing. The Russian pear trees made a fine growth and were free from blight.

The experimental orchard is yet too young to expect much fruit from it. The season was unfavorable for a crop of plums. The heavy frost in May occurred after most of the bloom had fallen from the trees and the young fruit had formed, and only a portion of the larger ones matured any fruit. The De Soto, Rollingstone and Cheney did the best with us. The newer varieties were a total failure. We have secured for planting in the spring, trees of the Peerless, Itaska, Estaline, Iowa Beauty and Pattens Duchess No. 3.

As the Horticultural Societies' stations are purely charitable institutions conducted without cost to the society and for the future good of the whole country, and from the fact that there will no profit accrue to the planter from an orchard containing from one to a half dozen trees of a variety even if all should prove hardy and good, we extend an invitation to all parties who have new seedlings of promise to place a few with us for testing and promise that their rights as originators or propagators shall be respected.

PRESIDENT'S ADDRESS BEFORE THE McLEOD COUNTY HORTICULTURAL SOCIETY.

BY M. CUTLER, SUMTER.

Ladies and Gentlemen:

The task of preparing an agreeable and instructive address for an occasion of this kind, is not an easy one for me. If I was engaged in horticultural work alone it might be otherwise, but as I am a general farmer I scarcely get my mind fixed upon a horticultural theme ere there arises visions of pens filled with pigs anxious for their supper, colts pawing for their oats, cows to be milked or poultry to be fed, so that you need not be surprised if this paper proves to be a kind of a succotash arrangement. To the great majority of horticulturists the past year has been one of sorrow and disappointment, while to the lucky few who had a good crop, it has been one of profit and gladness. We have heard of Kansas farmers who realized over six thousand dollars for their apple crop. And even in

Minnesota, where it has been supposed apples could never be profitably grown, several orchards have proven very profitable to the owners. And I am pleased to say that such old veterans in the horticultural work of the state as J. S. Harris, who have studied and investigated the subject for more than a quarter of a century, believe that apples can be profitably grown for home use and market in many portions of our state. And I must confess that, although I have been a skeptic on the subject, that after seeing the grand display of home grown fruit at our state fair, and hearing of the large crops harvested from some of the orchards of our state, I am nearly convinced that with the new seedlings and hardy Russians being set out and propagated, we will soon be growing quite a quantity of apples.

I am informed that over three thousand bushels of fine apples were sold from the old Jordan farm near Rochester, and that the total fruit crop of the farm amounted to over five thousand dollars, the renter having bought and paid for the farm with this year's proceeds of the fruit. I might give you several other instances of large and profitable yields of apples and small fruits, but these have been the rare exceptions, and the question which still confronts us is, how can we grow, with any degree of certainty, plenty of fruit for home use?

The first, and I think most important point, is to get kinds adapted to our climate and different kinds of soil.

The second is, how to cultivate and manage the different kinds after we get them. In considering the first, we must look for earliness and hardiness. One of the best of the small fruits is the grape, which is seldom found in the yards of our farmers or villagers. It is easily cared for, and should be found in every garden.

To succeed with grapes buy good two year old vines of the following kinds: Worden, Moores Early, Brighton and Janesville. Set in rows eight feet apart each way. Cultivate well; keep ground well fertilized, and as cold weather approaches trim, lay down, and cover, and you will seldom fail to have nice fruit.

STRAWBERRIES.

After testing many kinds I find the Crescent and Glendale the most profitable. The Jessie is good but has not proven profitable thus far. I set the plants the last of April or first of May in rows four feet apart and one to two feet in the row. Wood ashes scattered over the soil and harrowed in I have found the best and only needed fertilizer on our rich soil.

The plants should be well cultivated with a fine tooth cultivator, and when the ground freezes, well covered with corn stalks or slough hay.

By following these few simple directions I have not failed to have a family supply of this delicious fruit in fifteen years. But I have not time to give details in regard to growing of all the different kinds of small fruits that can be successfully grown here. Our annual report gives instructions in detail by the best experts in the state, and you can obtain it by paying the small sum of fifty cents to our secretary.

Thus far I have given you the bright side of horticultural work. I will now notice some things that will discourage the ambitious grower of fruit. To succeed in growing fruit for the market, you must have the finest and most productive kinds, so you send for the catalogues of the various dealers, and instead of selecting the old and tried kinds, you go

for the two dollar per dozen strawberries, the two dollar per plant grape, etc. The result is generally disappointment. The dearest plants ever bought were the Jumbo, paying five dollars for fifty. The cheapest, the Crescent, at one dollar per hundred. Another cause of failure is, rushing into the business before you have learned the details. The growing of fruit in the country for market requires good judgment and as much brain work as to run a bank or store, besides lots of muscular work.

EVERGREENS.

I desire to call your attention to this highly useful and ornamental tree, thousands of which have been set out in our county and but few are living. I believe they can be successfully grown here by observing the following simple rules: 1. Set no trees sold by peddlers who have brought them from the woods. 2. Send to a reliable nurseryman and get trees that have been transplanted at least three times. 3. Have them come to you early in the spring. 4. Do not let sun or wind get to the roots. 5. Mulch the ground around the trees.

In conclusion, I hope and trust that this meeting has been a profitable one to you all, and that it will be the means of awakening new interest in horticultural work.

MEETING OF THE SOUTHERN MINNESOTA ASSOCIATION.

BY WAYLAND STEDMAN, SEC'Y.

The annual winter meeting of the Southern Minnesota Horticultural Society was held in this city February 19th, 1891.

The following officers were elected:

President—Wm. Somerville, Viola.

Vice President—M. L. Tibbetts, St. Charles.

Secretary and Treasurer—Wayland Stedman, Rochester.

Executive Committee—M. W. Cook, R. C. Keel and L. McLain.

Mr. R. C. Keel presented a paper telling of his fruit crop in 1890. He raised over two thousand bushels of apples and found ready sale for them all. He has two hundred varieties, but believes that there are only about ten varieties that are profitable in this climate.

Mr. W. N. Herrick said that the Wealthy apples that he bought of Mr. Keel were the best and prettiest and most salable apples that he ever saw. He was sorry that they were not winter apples.

President Somerville said that some of the Russian varieties were winter apples and believed that as soon as they were generally planted, that we would raise our winter apples in this part of our state. He was asked to name the ten varieties that farmers of Southern Minnesota ought to plant.

The following is the list, named in order of their maturing: Apples for Southern Minnesota, Yellow Transparent, Duchess, Red Anis, White Pigeon, Russian Green, Cook's Anis, Wealthy, Longfield, Repka Melinka, Hibernal, Red Queen.

Red Queen apples, raised in this county, have kept until May.

Mr. Somerville also recommended the Crab Whitney No. 20.

Mr. M. W. Cook said that he still believed that the Crescent Seedling, properly fertilized, is the best variety of strawberries, both on account of hardiness and productiveness, quality and continuous bearing.

When asked what he meant by being properly fertilized, he said: "I set three rows of Crescents, then one row of a variety with perfect flowers, which bears large berries, blossoms continuously and is hardy. And I know of no variety that fills the bill better than the Jessie. The Jessies are very sweet berries and they improve the quality of the Crescents." The Bubach is also a variety that he recommends. They should be fertilized in the same way as the Crescents.

Mr. D. G. Eastman said that his favorite crops were corn and strawberries. Corn, he said, needed to be kept entirely free from weeds and grass. He never liked to see a single weed in his corn field, but strawberries were different. He did not want to argue against keeping the strawberry patch clean; but from the patch that he neglected he got better berries than from the one that he kept clean.

Mr. Elmer G. Ballard has tried many of the new black cap raspberries, but he still sticks to his old friend, the Doolittle, which has never failed with him, whether the season was wet or dry. Last spring he set more of them than any other variety.

Mr. E. D. Wattles thinks that grass growing in the hills of corn injures the crop, especially in dry seasons. He hoes his corn with a hand hoe and thinks it pays. He raised the best corn in his neighborhood last year.

Wayland Stedman hoped that the time would come when there would be a well kept lawn and a few flower beds around every farm house in our county. Flowers are the most profitable of all crops. They don't bring money but they bring contentment.

Mr. A. W. Sias has been president of our society since its organization. We feel our loss at this time, and we wish him success in his new field.

Our summer meeting will be held in strawberry time. Notice will be given in due time.

REPORT OF COMMITTEE ON NOMENCLATURE AND CATALOGUE.

BY J. S. HARRIS, LA CRESCENT.

Secretary Minnesota State Horticultural Society:

Your committee submit descriptions of the following varieties of apples, viz: Malinda, Drake, Wabasha, Rollins' Pippin, Faribault, Newell's Winter and Red Queen, and recommend that they be published as a continuation of the list begun in 1890, and carried to their proper place in the catalogue.

J. S. HARRIS, Ch'n. Com.

Malinda, size full medium, form conical, somewhat angular, color pale green to yellow with blush cheek where exposed to the sun, stem medium, cavity deep, calyx closed, basin ridged, flesh pale yellow, a little coarse and flavor nearly sweet. Season, late winter. Origin, Viola, Minn. Tree a vigorous upright grower and more hardy than Wealthy.

Wabasha, size medium, form smooth roundish, color greenish-yellow, mostly covered with blush; stem medium long, strong, set in a rather broad cavity, calyx half open, basin broad and shallow, flesh pale yellow, fine grained, flavor sub-acid, good. Season, winter. Origin, Olmstead county, Minn. The tree is about half hardy.

Rollins Pippin, size medium, form round oblate, color greenish yellow showing minute white dots, blush on the sun side, calyx open in a broad shallow basin, stem medium, strong, set in a medium deep, smooth, more or less russeted cavity, flesh yellowish white, fine grained, crisp, flavor sub-acid. Season, January to March. Origin, Olmstead county, Minn. Stood the winter of 1884 and 1885 as well as the Wealthy.

Drake, size medium, form round oblate, color greenish yellow, striped on sun side with carmine red, flesh white, fine grained, juicy, pleasant acid flavor, stem medium stout, cavity medium. Season, January. Free annual bearer, productive. Origin, Rice county, Minn. Only valuable when top worked on hardy stocks.

Newell's Winter, size full medium, form oblate conical, color lemon yellow with faint red on sun side, skin rough and covered with fine brownish dots, stem short, medium strong in a deep somewhat irregular russeted cavity, calyx closed, basin medium, broad and corrugated, flesh yellow, fine grained, firm, sub-acid, good. Season, January to March. Use, kitchen and market. Origin, Sauk county, Wis.

Faribault, size small, form roundish, color pale green mostly covered with brownish red, skin very smooth, flesh greenish white, fine grained, juicy, flavor sub-acid. Season, January to March. Original tree 22 years old, hardy and productive, annual bearer. Origin, Rice county, Minn.

RED QUEEN. RUSSIAN.

Size medium, form roundish a little oblique, color greenish yellow striped with light and deep red, skin smooth. Stem short and medium stout, set in a narrow russeted cavity, calyx large, half open in a broad corrugated basin, flesh yellowish, a little coarse, core medium, flavor pleasant and better than Willow Twig. Season, January to March. Trees of this variety endured the winters of 1884 to '85 at Mr. Tuttle's place, Baraboo, Wis., Wm. Somerville, Viola, Minn., M. L. Tibbetts, Dover and J. H. Keel's, Rochester.

APPLES.

NAME.	Size.	Form.	Color.	Quality.	Season.	Hardiness.	Desert.	Kitchen.	Market.	Origin.
Malinda.....	M.	r. c.	g. y. r.	fair.	winter.	8	4	6	8	Minnesota.
Wabasha.....	M.	r.	g. y. r.	good.	winter.	7	7	7	8	Minnesota.
Rollens Pippin	M.	r. ob.	y. blush	good.	winter.	6	8	7	9	Minnesota.
Drake.....	M.	r. ob. c.	y. s. r.	good.	winter.	6	7	7	9	Minnesota.
Faribault.....	S.	r.	g. pale r.	fair.	winter.	8	8	6	5	Minnesota.
Newell's Winter..	L.M.	ob. c.	y.	good.	winter.	8	6	10	18	Wisconsin.
NEWER RUSSIANS.										
Red Queen.....	L.M.	r. c.	y. r.	fair.	winter.	9	5	10	8	Russia.

**REPORT OF DELEGATE TO ANNUAL MEETING OF NORTHERN
IOWA HORTICULTURAL SOCIETY.**

BY J. S. HARRIS, LA CRESCENT,

Manchester, Ia., is a beautiful young city of from two to three thousand inhabitants, situated in the midst of a tract of the most fertile and best cultivated land in the state, and lies 47 miles due west of Dubuque. Its clean streets, elegant business houses, commodious town hall, churches, schoolhouses and other public buildings, tasty residences, with a profusion of flowers in the windows, lawns and shade trees in abundance strike the visitor favorably, and present unmistakable signs of the thrift and prosperity of a people who move in the highest circles of intelligence and refinement.

Here the Northern Iowa Horticultural Society held its last meeting, Dec. 16-18, last. The attendance was good, and the entire meeting was both enthusiastic and profitable. Three sessions were held each day. The morning session of the first day was devoted principally to receiving the reports of directors, of which the society has seven. The substance of the reports was that the interest taken in horticulture is least among those who would be the most benefited by it, *the farmers*, and greatest among the owners of lots and small plantations in and near villages; but the interest is growing everywhere. One director reported that he now found ten persons growing small fruits for home use where there was one ten years ago, and yet the demand for fruit in the markets continues to increase.

Reports showed that the last strawberry crop was generally light, and the quality not the best, probably owing to the unusually wet weather that prevailed at the time of ripening. Of the old varieties, the Crescent proved the most profitable; and of the new, the Warfield No. 2 was most highly commended for its even size, beautiful appearance, good shipping qualities and great productiveness.

The raspberry crop was reported as generally short. Blackberries were generally a good crop. The Snyder is the variety most grown. The Lucretia dewberry is reported as being unprofitable to grow for market. Currants and gooseberries were less than a full crop, the old Red Dutch and Victoria doing the best. Plums, with a few exceptions, were a poor crop; grapes, generally good. Apples, except in some unfavorable locations, were a good crop. In the winter of 1884-5 the old orchards over northern Iowa suffered severely; many varieties were killed to the ground, and nearly every variety more or less injured. Orchardists were disheartened, and for a time neglected their trees. The Duchess and Wealthy have proven the most profitable varieties.

President J. C. Ferry's address was an interesting and well prepared paper. He urged that more encouragement should be given to the growing of varieties from seed; and that when an apparently good variety is found it should be thoroughly tested at experiment stations before being thrown upon the market.

The evening session was taken up with an address of welcome and a response, and papers on decoration of home grounds, the model rural home, and kindred topics, all of which were intensely interesting.

The second and third days were filled from early morning till a late hour at night with the reading of papers and the discussion of such topics

as are of most vital importance to the horticulturist, and which tend to elevate, refine and improve the condition of the wealth producers of the country. The size and age of trees for planting, modes of culture to ensure successful orcharding, object lessons in pruning, native plums, grapes, evergreens, landscape gardening, humbugs, higher education and many other subjects that our limited space will not permit us to mention were discussed. The papers were generally prepared from the standpoint of experience and careful observation, and were able, clear and convincing.

Delegates were present from the Eastern and Western Iowa Horticultural Societies, and Minnesota was represented by E. H. S. Dartt, of the experiment station at Owatonna, O. F. Brand, Rice Co., and J. S. Harris, Houston Co.

In connection with the meeting there was a fine exhibition of apples grown in northern Iowa, and a fine display of canned fruits. In standard varieties of apples were found the Wealthy, Haas, Plumb Cider, Perry Russet, Willow, Roman Stem, Wolf River, Utter, and others; also a number of varieties of Russians, and several good collections of seedlings. The largest collection of the latter was from the orchard of Mr. Thompson, of Grundy Co., a dozen or more varieties, large, showy, and generally of good quality. Six varieties were shown in quantity from an orchard in Clayton Co., from trees said to be 25 years old, and good bearers, 21 bushels having been gathered from one tree last year, and a good crop this year. None of them may prove hardy enough for Minnesota, but they are evidently more hardy than most of the varieties we planted a few years ago. Another collection was shown that originated in Fayette county; two or three of them are excellent. C. G. Patten showed four varieties of Duchess seedlings. The most valuable is probably the No. 3, or Patten's Greening. The tree is believed to be as hardy as the Duchess of Oldenburg, resists blight well, and is an early and free bearer of an apple above medium in size, flat round, yellow in color, and when ripe often with blush on the sun side. The flesh is fine grained and juicy, and of a pleasant acid flavor; it is a good cooker, and better than Ben Davis for eating. The variety is said to be doing well wherever on trial. O. F. Brand had a few plates of the Peerless on exhibition. It is a fine looking fruit, just about the right size for profit, and is at this time a good apple for eating. Will probably keep well into January.

ON HORTICULTURAL MAPS.

A COMMUNICATION FROM N. H. WINCHELL, STATE GEOLOGIST.

UNIVERSITY OF MINNESOTA, Jan. 13, 1891.

President Wyman Elliot, Horticultural Society.

DEAR SIR: Agreeably to your request I give a statement of the ground covered by the series of maps which you examined at my office a few days ago.

These maps, numbering twenty altogether, are based on and express the results of the work of the geological and natural history survey, in all its economic bearings susceptible of such mapping, since its commencement in 1872 to 1884. They were made for exhibition at New Orleans, at the late cotton exposition, and had the report of that exposition, which

was made to the Governor, ever been published, it is probable that these maps would have been a portion of it. They were constructed by Mr. Warren Upham, late an assistant of the survey, but they have been so damaged by the smoke that pervaded the new science hall of the university at the fire, last winter, that they are not fit for any use except to reproduce them for publication or for another exhibition. At the same time, in case of reproduction for any purpose, they should be corrected in some respects, to bring them up to date, because in the course of the later investigations of the survey, some discoveries have been made in the northern part of the state, which of course are not expressed by these maps as they are now. They are briefly described as follows:

1. A geological map, showing the areas of the formations, except the drift and the cretaceous.
2. The character and distribution of the glacial drift. This is divided into morainic areas and gravel or clay plains, and the post-glacial alluvium.
3. The sub-soils of the state, whether of clay or loam, or of gravel, or of boulder-clay; also, whether of red boulder-clay or of blue.
4. Contour-line map, (colored,) to show those areas lower than 700 feet above the sea, between 700 and 800 feet, and those higher than 800 feet above the sea.
5. Contour-line map, (colored,) to show the same areas for 900 feet and 1,000 feet above the sea.
6. Contour-line map, (colored,) to show the same areas for 1,100 feet and 1,200 feet above the sea.
7. Contour-line map, (colored,) to show the same areas for 1,300 feet and 1,400 feet above the sea.
8. Contour-line map, (colored,) to show the same areas for 1,500 feet and 1,600 feet above the sea.
9. Contour-line map to show (by colored areas) those portions 1,700 feet and 1,800 feet above the sea.
10. Contour-line map to show (by colors) those areas below 1,900 feet, those between 1,900 feet and 2,000 feet, and those above 2,000 feet above the sea.
11. Contour-line map showing, with intervals of 100 feet, in a condensed manner, the entire topographic outline of the state, from 600 feet to over 2,600 feet above the sea.
12. Map showing the drainage basins of the state, and their comparative areas.
13. Map showing the distribution of the lakes of the state, the whole area being divided between *abundant lakes*, *scant lakes*, and *no lakes*.
14. Map showing the chief topographic features, viz:—the flats, the undulating expanses and the rough and hilly portions.
15. Map showing the distribution of the forest and prairie of the state and the northern and southern limits of some of the trees.
16. Map showing the mean annual rain-fall and its distribution over the state.
17. Map showing isotherms of mean temperature for the year.
18. Map showing isotherms of mean temperature for January.
19. Map showing isotherms of mean temperature for July.

20. Map showing the geographical names and their dates prior to Nicollet's map of 1842.

Each of the foregoing maps covers the whole state, and is of the size 3 feet by 3½ feet, on heavy paper, with spring roller mountings, and can be hung in a common case where they remain rolled, from which any one of them may be pulled down for examination. In that form they were displayed at New Orleans, and were examined by many people.

It has been suggested that those maps should be published, in some way, by the horticultural society, or by the society and the survey jointly. It is evident that they embody a large amount of labor by the survey, and I should desire that whatever be the issue of your plans, the survey might have the opportunity of revising them and should finally be allowed the credit of originating them. The general law of the survey, passed in 1872 requires such investigations and such mapping, and it is our purpose, by and by, when the work of the survey is far enough along, to present in one of our final volumes some such maps, accompanied by a suitable text discussion and description of each. These would be united with other maps of the survey, and would constitute a general *atlas of the state* in uniform style with those volumes that have been published already. It is apparent, however, that there is need of earlier publication of these maps, and I am glad the horticultural society seems to be interested in the work and results of the survey so far as to inquire for them, and to prompt more rapid work and publication.

In the prosecution of the survey I have been following a plan; and the preparations of the agricultural and climatological volume of the final report has been anticipated as one of the later volumes. In due time this would be worked out and published. But should it be found desirable and feasible to deviate from the plan so as to enter sooner upon these features, perhaps it may be, through the co-operation of the horticultural and the agricultural societies, best to prepare these maps for immediate publication. There are two ways by which this may be accomplished.

1. Publish the maps as they are, or as they could be corrected, in an edition suitable for the horticultural report. When once prepared and printed the edition should be large enough to supply one of the annual reports of the geological survey, to be issued contemporaneously with the report of the horticultural society. The cost could be divided between the society and the survey.

2. Take a little more time and have chapters prepared to accompany each map. Some of these chapters should be prepared by persons selected by the horticultural society, or by the agricultural college. When ready, have the volume issued as one of the final volumes of the geological survey, the cost of publication being met by appropriation by the legislature.

In conclusion, I may say that I only wish that the maps may be made useful. It was a mistake that there never was any provision made for the publication of the report of the New Orleans exposition, at which the State of Minnesota expended a large amount of money, and also when Minnesota was honored by awards by the government commissioners, and in which the horticultural society took a leading part in the preparation of exhibits.

I would suggest that the society express its preference as to the disposition of these maps, and appoint a committee to carry out their views. I shall be glad to co-operate in any way.

Respectfully,

N. H. WINCHELL,
State Geologist.

OBITUARIES, 1890.

BY J. S. HARRIS.

OBITUARY OF PATRICK BARRY, ROCHESTER, N. Y.

The well known nurseryman, pomologist and author, Patrick Barry, died at his home in Rochester, N. Y., on the morning of June 23d, at the age of 74 years. Mr. Barry was the son of an Irish farmer, and born near Belfast, Ireland, in 1816. He came to this country in 1836, and engaged as a clerk in nurseries at Flushing, L. I., where he remained about four years, and where he made himself master of all the details of the business. In 1840 he removed to Rochester, and in July of that year formed a partnership with George Elwanger, and they founded the Mount Hope Nurseries, which have since acquired worldwide reputation. Mr. Barry was an associate and esteemed friend of the Downings, Marshall P. Wilder, and other noted fruit men who organized the American Pomological Society, and to whom our country is indebted for its present standing in the horticultural world. He was for several years editor of the *Horticultrist*, and horticultural editor of the *Genesee Farmer*, and his plain and enthusiastic writings influenced thousands to supply their farms with orchard and garden fruits; town and suburban residents to lay out their grounds and plant ornamental trees and plants; inspired the lining of streets and highways with shade trees, and conducted to making parks attractive, and ornamenting cemeteries. Many a man who read his writings received an impetus that led him on to become an enthusiastic horticultrist and a public spirited citizen. Mr. Barry's work, "The Fruit Garden," is one of the best guides and instructors to the young fruit grower to be found in horticultural literature. But perhaps the most valuable of all his works was the preparation of the "Catalogue of Fruits", as published in the reports of the American Pomological Society, of which he was first vice-president.

Mr. Barry was a man of marvelous energy and executive ability, and has long been recognized as the head of New York state horticulture. He was an upright, liberal and industrious man, who may well be held up as a model for youth. A thousand homes are brighter, better and happier for his useful life and example.

OBITUARY OF CHARLES GIBB, ABBOTSFORD, QUEBEC.

The late Mr. Charles Gibb, of Abbotsford, Quebec, died at Cairo, Egypt, on his way from Ceylon, March 8th, 1890, at the early age of 45, from pneumonia, which had developed from la grippe contracted at Aden, and his remains were interred in the British protestant cemetery on March 11th, his funeral being attended by several friends. Mr. Charles Gibb was born at Montreal on the 30th day of June, 1846. He received his early education at Bishops College, Lenoxville, and went from there to McGill College, Montreal, where he graduated B. A. at the age of nineteen. Close application to study had injured his eyesight and undermined his health and he was advised by physicians to seek recuperation in foreign travel.

His first trip was of two or three years duration and embraced visits to Egypt, the Holy Land and afterward Switzerland and Europe generally. On his return he engaged in the cultivation of fruit in the State of Pennsylvania, but the climate not agreeing with him he returned to Canada and purchased a farm at Abbotsford, a place that has become well known of late years on account of the interesting experiments he has carried on there with Russian and other fruits. In 1873 he made repeated trips to the United States, studying our pomology and gathering up and taking to his farm everything he thought worthy of trial, stocking his own farm and making free distribution of trees and plants to his neighbors. In 1882, in company with Prof. Budd, of the Iowa Agricultural College, he went to Russia in quest of the most hardy fruits that might be expected to endure the extremes of temperature to which the northern parts of Canada and the United States are subject. The result of his trip was the importing of trees and seeds that have been very generally distributed among the experimental stations of Canada and northern United States and has created hopes of final successful fruit culture in those regions. In 1887 he went alone over the same grounds and visited in addition Norway, Sweden and Denmark. Other trips he made in the interest of horticulture, among them visiting our own state and Wisconsin and other portions of the far northwest. In July, 1889, he left for this last trip around the world, taking in Japan, China, India, and freighted with much valuable information he was on his way home when his death occurred.

Although cut off in the prime of life he has left many works which will be a lasting monument to his memory. Among them notes on the trees and shrubs of Europe, Russian fruit, hardy fruits for the cold north, nomenclature of Russian fruits, etc. No man of the period will be so deeply mourned by those who are trying to solve the problem of fruit growing in the north as is Charles Gibb. There is perhaps no man living that has so generously and unselfishly devoted his life and wealth and talents to the advancement of horticulture in his own country and indirectly ours.

No man has done more for his country and ours than he. May the memory of his works endure forever and generations yet unborn enjoy the blessed fruits of his devoted labor of love. Who will catch up the fallen banners and keep unfurled to the breeze until success has crowned all labors and Canada and Minnesota are recognized by the whole world as the best fruit regions on the American continent.

OBITUARY OF RICHARD L. COTTERELL, DOVER.

Died, at the old home farm, Dover, Olmsted county, Minnesota, Richard Lloyd Cotterell, born in the county of Worcestershire, England, January 12th, 1815, died April 19, 1891.

Mr. Cotterell in early life learned the shoemaker's trade, which he followed for some years in England, then came to America in the year 1846; first settled in the village of Jefferson, Wisconsin, then moved to Dodgeville, Wisconsin. In both of these places he engaged extensively in the boot and shoe trade. In the spring of 1856 he sold out his business and with his family of small children started with all his possessions for the young territory of Minnesota, settled upon the nw $\frac{1}{4}$ section 3, township of Dover, where he and the family have continuously lived to the day of his death. Mr. Cotterell by his industry and perseverance, had out of the wild prairie made one of the finest farms in southern Minnesota. He was one of the first to early engage in the culture of fruit until his place became noted, far and near, for its fine fruits. Mr. Cotterell early became interested in the fair held at Rochester, as the State, and later as the Southern Minnesota Fair, and he invariably secured a large per cent of the premiums given for the excellence of the products from his field and orchard. Many throughout the northwest and especially Olmsted county will remember the warm welcome ever accorded to any and all who were privileged to call at his home. They were all warmly welcomed by Mr. Cotterell and family and went away feeling that it would be pleasant to call again. Mr. Cotterell was a life member of the State Horticultural Society; also a member of the Methodist church. He left a large family of grown sons and daughters and a goodly number of grand-children, by whom he will ever be remembered with love. Mrs. Cotterell died two years ago last December.

PROCEEDINGS OF THE ANNUAL MEETING
OF THE
Minnesota Bee-Keeper's Association

For the Year 1891.

Prepared for Publication by the President,
J. P. WEST, Hastings, Minn.

OFFICERS AND MEMBERS FOR 1891.

PRESIDENT.

J. P. WEST.....Hastings.

VICE-PRESIDENTS.

B. TAYLOR.....Forestville.
C. THEILMANN.....Theilmanton.
H. W. MENDENHALL.....Rapidan.
WILLIAM URIE.....Minneapolis.
J. M. DOUDNA.....Alexandria.

SECRETARY.

WILLIAM DANFORTH.....Red Wing.

TREASURER.

L. E. DAY.....Farmington.

EXECUTIVE COMMITTEE.

M. CUTLER.....Sumter.
WILLIAM URIE.....Minneapolis.
L. H. WILCOX.....Hastings.
WILLIAM DANFORTH.....Red Wing.
J. P. WEST.....Hastings.

ANNUAL MEMBERS.

H. F. Messer, Plainview.	S. D. Haskin, Waterville.
D. B. Messer, Plainview.	J. S. Featherstone, Hastings.
Edward R. Pond, Bloomington.	A. N. Wilcox, Hastings.
Gideon H. Pond, Bloomington.	W. J. Tingby, Stillwater.
Francis Dick, Afton.	H. H. Heins, Lydia.
J. E. Jackman, Stillwater.	Frank Moeser, Minneapolis,
S. L. Bohannon, Minneapolis.	J. G. Bass, Hamline.
J. S. McIntire, Maple Plain.	P. F. Bradford, Empire.
E. Kimball, Forest City.	William Dyer, Hastings.
J. A. Holmberg, Saint Paul.	N. P. Aspinwall, Harrison.
F. E. Ford, Glencoe.	A. C. Sanford, Ono, Wisconsin.
J. W. Murray, Excelsior.	

CONSTITUTION OF THE MINNESOTA BEE-KEEPERS' ASSOCIATION.

ART. 1. This association shall be known as the Minnesota Bee-Keepers' Association.

ART. 2. The object of this association shall be the promotion of scientific bee culture by forming a strong bond of union among bee-keepers.

ART. 3. The officers of this association shall consist of a president, five vice-presidents, secretary, treasurer, and an executive committee consisting of three members, of which committee the president and secretary shall be members ex-officio.

ART. 4. Any person can become a member of this association by paying to the treasurer the sum of one dollar as a membership fee and signing the constitution, and paying annually thereafter dues of fifty cents.

ART. 5. Any person interested in bee culture may become an honorary member by a two-thirds vote of the members present and voting at any regular annual meeting.

ART. 6. The regular meeting of this association shall be held at such time and place as shall be agreed upon by the executive committee, notice of which shall be given to all members. Five members shall constitute a quorum for the transaction of business, but a less number may enter upon a discussion and adjourn till some future day.

ART. 7. Special meetings may be called by the executive committee whenever they shall deem it necessary.

ART. 8. The executive committee of this association shall constitute a committee to select subjects for discussions and appoint members to deliver addresses or read essays and the same shall be published with the call for the next annual meeting.

ART. 9. This constitution may be amended by a two-thirds vote at any regular meeting.

BY-LAWS.

ART. 1. The officers of this association shall be elected by a majority ballot.

ART. 2. It shall be the duty of the president to call and preserve order in all meetings of the association; to call for all reports of officers and standing committees; to put to vote all motions regularly seconded; to decide upon all questions of order according to the constitution and by-laws of the association and in accordance with parliamentary usage, and at each annual meeting at the expiration of his term of office to deliver an address before the association.

ART. 3. It shall be the duty of one of the vice-presidents, in absence of the president, to perform the duties of that office.

ART. 4. It shall be the duty of the secretary to call the names of the members of the association at the opening of each stated meeting and to receive the annual dues; to report all proceedings of the association and record the same, when approved, in the secretary's book; to conduct all correspondence of the association, and to file and preserve all papers belonging to the same; to take and record the name and address of every

person who becomes a member of the association, and to transfer the moneys received for dues or otherwise to the treasurer, after taking a receipt for the same; to make out and publish annually, as far as practicable, a statistical table showing the number of colonies owned in the spring, and the amount of honey and wax produced (together with such other information as may be deemed beneficial) by each member of the association; and to give notice of all regular meetings of the association in the available papers in the district covered by the association, and in the bee papers at least four weeks before the time of such meeting.

ART. 5. It shall be the duty of the treasurer to receive from the secretary the funds of the association and give a receipt for the same, to pay them out upon the order of the executive committee and to render a written report of all the receipts and expenditures of the association at each regular meeting. The treasurer shall give a bond to the association in such amount as the executive committee may require.

ART. 6. The members of the executive committee not including the president and secretary, shall be a committee on finance, and it shall be their duty to audit all bills before they shall be ordered paid by the president and secretary.

ART. 7. The secretary shall have power to choose an assistant secretary if deemed necessary.

ART. 8. The association shall be mainly governed by the following order of business:

Call to order.

Reading the minutes of the last annual meeting and all intervening meetings.

Calling the roll.

Reception of members.

Collection of dues.

Secretary's report.

Treasurer's report.

Report of standing committees.

President's address.

Election and installation of officers.

Miscellaneous business.

Discussion.

Adjournment.

ART. 9. The executive committee of this association shall cause the constitution and by-laws to be printed in appropriate form, and every person joining the association shall be entitled to a copy of the same.

ART. 10. These by-laws may be amended by a two thirds vote of all the members present at any regular meeting of the association.

PROCEEDINGS
OF THE
MINNESOTA BEE-KEEPERS ASSOCIATION.

THURSDAY MORNING SESSION.

JANUARY 21, 1891.

The Association was called to order by the President L. H. Wilcox, who made some appropriate remarks. On motion the rules were unanimously suspended, and the foregoing Constitution and By-Laws were unanimously adopted, after which a recess of ten minutes was taken to give members a chance to sign the constitution. On assembling again the association proceeded to elect by ballot officers for the ensuing year, and the following officers were elected:

President, J. P. West, Hastings; Vice-Presidents, B. Taylor, Forestville; H. W. Mendenhall, Rapidan; C. Theilmann, Theilmantown; Wm. Urié, Minneapolis; J. M. Doudna, Alexandria; Secretary, Wm. Danforth, Red Wing; Treasurer, L. E. Day, Farmington; Executive Committee, M. Cutler, Sumter; Wm. Urié, Minneapolis; L. H. Wilcox, Hastings.

On motion the executive committee were instructed to ask the legislature for an appropriation from the state for the benefit of the society; they were also instructed to attend to the duty of having the premium list offered by the State Agricultural Society revised, and to look after the necessary legislation for the association. On motion a recess was taken until 2 o'clock P. M.

WEDNESDAY AFTERNOON SESSION.

JANUARY 21, 2 P. M.

The meeting was called to order by the president, L. H. Wilcox,

Mr. Theilmann then read a paper on wintering bees.

WINTERING BEES.

BY C. THEILMANN, OF THEILMANTON.

Ladies and Gentlemen:

I am requested to read a paper on "wintering" bees; I will give you some of my experience and experiments in this branch of bee-keeping.

Wintering bees is one of the most important questions in bee culture. In our northern climate many different ways have been tried and practiced and much has been written about "how to winter bees successfully." On the whole they are wintered with greater success late years than they were ten or fifteen years ago; this shows that bee-keeping is progressing, though there is still more to be learned, as some of our brethren occasionally meet with heavy losses and then wonder how this comes; the answer that could be given is, as a rule, that many little things together will bring about this result, besides nearly every bee-keeper has a hobby of his own, in which he has great confidence. This I know to be so from my own experience, as I used to have more than one, and, as a rule, bee-keepers are alike in this respect. Sometimes when I read of these new discoveries and hobbies, which I practiced years ago myself, I cannot help but smile, and again a feeling of sadness comes over me when it reminds me of how I have punished and manipulated my bees to death with some of the "novices" hobbies. I once killed seventy colonies when I thought I was doing my best. I have tried to winter my bees in nearly all the different ways and methods which we read about nowadays in our bee-books and periodicals, such as "out door non-protection," "out door protection," with outer cases filled with chaff or leaves, holes through the combs, sticks over the brood frames, and contraction of the brood nest with "dummies," and once I left the brood nest bare on top without anything over the frames; all I had at the time was twenty-four colonies, and all of them wintered nicely.

How is this for "non-upward" ventilation? I wintered for three winters in a double-walled frame building, filled in with sawdust; it was burned by heating it artificially, and I lost eighty-seven colonies.

All of the foregoing methods gave me a great deal of work, expense, loss and much dissatisfaction, so I have abandoned them all, and for the past six years have wintered my bees underground. I came to the conclusion after one trial that an underground repository, rightly made, was the safest place to winter bees in Minnesota. My losses have been very light since; it also saves me a great deal of time and tinkering compared with my former methods. All that I do to my bees now is in the latter part of September, or the fore part of October, to see that each colony has from twenty-five to thirty-five lbs. of stores (according to their population). The cap of each hive is left on their respective stands, with the same number on it as on the brood chamber, so as to know its place when set out in the spring. Some bee-keepers claim that it does not make any difference where the colonies are put in the spring; this is a mistake, and has ruined many colonies of bees, as they have not forgotten their old location while in confinement. The cellar should be constructed so that no frost can get in, it should be roomy, the air should be kept pure, with a temperature of from 45 to 45 degrees above zero. It is rarely I water my bees in confinement, though sometimes towards spring they seem to get thirsty and uneasy, and I then give them a little ice or snow in front of their entrance, which seems to quiet them. For the past eight years I have abandoned the cushions over the frames and have not used anything but the honey board over the brood nest, which I find far better than wet and moldy cushions. There are many more things which really belong to "wintering bees;" I would say right here that we must work our bees

in summer and autumn, so that they will be ready and in proper condition when the honey season closes; herein lies the great secret of success, (here in Minnesota we generally have a honey flow in September.) Properly speaking, to separate wintering bees from summering them, to say the least, is a misnomer, and would be like dividing a man into his body and into his spirit; if one is neglected the other is affected thereby. It is also like grape culture. To be successful we must select and properly prepare the young vines for the next year's crop, while in the meantime we are raising our present year's crop of grapes. So with bees, our colonies must be properly worked and fitted in the summer in order to obtain the best results in wintering them. The best worker brood combs should be put in the center of the brood nest and the less perfect ones, or some with patches of drone comb, towards the outside, &c., this, with a good prolific queen, will leave the colony strong and populous for the winter. Such colonies as a rule will always have their stores in the right position around and above the brood nest (if not spoiled and raked by their keeper.) When the winter sets in they are also fitted and prepared for early spring, after successful wintering, and can be left alone (if they have food enough) till warm weather sets in. I always put my bees into the cellar the first cold snap we get, which comes quite regularly from the 10th to the 14th of November—this has not failed for the past ten years. The time to set them out in the spring is not so regular and good judgment should be exercised; we must be very careful and not set them out too early as that has ruined many colonies, it should be warm enough for them to fly freely, as any degree under fifty-six degrees above zero in the shade will be destruction. At sixty degrees above in the shade there is no danger; as a rule I set my bees out from the 1st to the 10th of April. Many more things of less importance could be said, but that would make my essay too long and take up too much valuable time here. There are a few other methods of wintering bees, such as double-walled hives and others, but I have not tried them, nor have I any desire to do so, as I am willing to let well enough alone. Late years I have wintered my bees almost to perfection. I have only lost one swarm in the past three winters, and wintered from 145 to 280 colonies each winter.

DISCUSSION.

Pres. Wilcox: Gentlemen, you have heard the paper of Mr. Theilmann. It is now before the house, and open for discussion.

Mr. Cutler: I would like to ask Mr. Theilmann how he killed the seventy swarms?

C. Theilmann: My bee house is built half way into a side hill; and is covered with dirt except the roof and the front part of the house, which is double walled and filled with saw dust. The winter before I had the twenty-four colonies I spoke of in the same house. They only consumed from three to five

pounds of honey from November to April, which was the least amount I ever had consumed, or ever heard of being consumed. The combs were as clean as when I put them in, and the colonies seemed to be stronger than when I put them in. The next winter, when I killed those seventy colonies, I put them into the same house. In February they got too warm, and got the diarrhoea, and in three weeks over half of them were killed, and on May 1st I had only four left out of seventy-four.

Wm. Urie: Do I understand you to say that you take the board off from the top altogether?

C. Thielmann: After the honey season is over the first thing I do is to take them off, and put on the honey board over the frame.

Wm. Urie: Let me ask you right here, is your soil a clay soil or is it sandy?

C. Theilmann: It is a little sandy, but for the last nine years I have not wintered any bees outside. I raise my bees up when I put them in winter quarters, from ten inches to a foot above the floor. I make all my hives with a tight bottom board, in fact, I make them so tight now that they hold the feed. I just pour it into the hives and let them take it up themselves. That is the least trouble.

Wm. Urie: In regard to this, I used to experience a great deal of trouble when I had the Langstroth hive and the bottom board nailed solid to the hive, and of course, the bees glued that tight, but now I want my bottom board loose under all circumstances, but I do not want to go so far as some do in the bee journals. I have had forty-five years' experience with bees, and I have had them in four or five different states, and I have tested them in almost all shapes and forms, and I believe to-day I can take a hundred and fifty swarms of bees and not lose one by that method. My bees came out last spring in perfectly good condition. Bees require fresh air just the same as animals. Many people place them in a close cellar without giving them any pure air. In my discussion, this afternoon, I will give you my whole method. In the first place I do not believe in placing a swarm of bees under ground. It is a false idea. It will cost but little to make a bee house on top of the ground in Minnesota, but I want you to make a building that is frost proof, but arrange it in such a way that on mild days you can let through your bee house a stream of fresh air. You go into my bee house to-day and you will find it just as sweet as this

room. When you place them in the cellar about one-half or two-thirds come out in decent shape. That has been one of the greatest failures of beekeepers in the United States. If you will look back in the "Farm, Stock and Home" of a year ago you can see how I make my bee house; there are full directions in that paper.

C. Thielmann: Of course, this bee house that Mr. Urie speaks of is made a good deal different from mine. Mine was simply a house with double walls about two feet apart and that was filled in with sawdust. I wintered my bees three years in there, and when the temperature came down to 25 or 30 below it would be too cold in there, and the temperature would come down from 28 or 25 to 22 even, until I came to the conclusion that that was too cold. I used to fill a pot with hot coals from the stove and set it in there; I used to do it last winter, and the children did it sometimes and they were more careless than I was and the house got afire. Some sparks probably got in the sawdust and set it on fire, and it was burned up and I lost eighty-seven colonies in the house.

Wm. Danforth: Before I start to put my bees in the cellar in the fall I have a small frame made just the size of the hive. I never use tight bottom boards. I never have any mouldy combs, and my bees come out in good shape, and have for the past three winters.

Pres. Wilcox: I want to say just this; I use the plan recommended by Mr. Thielmann pretty nearly, but bear this in mind, gentlemen, if you keep the front open you want to keep your temperature four or five degrees warmer than you do without it.

C. Thielmann: I want to say a word on this bottom board question. I do believe I can winter my bees fully as good with loose bottom boards as I can with the tight, but the trouble is in raising the hives in summer, you always have the bottom board loose and it is a bother. Also when you put the bees in in the fall, and when you take them out in the spring. In the spring, as a rule, bees are very noisy, and they come out and boil over, and it is quite a difficult job to get your board under the hive again. That is the greatest objection to loose bottom boards.

B. Taylor: I think there has been some bad advice offered here and I am going to criticise it. I have been in the habit for many years of covering my hives in the winter with just common building paper, what we call strawboard, a piece cut the size of the hive tacked to a little frame, just like Mr. Dan-

forth places on his hive, then placed it on top of the hive and put a couple of screws in each end of it.

J. W. Murray: In regard to this question of wintering. Now I once left them out and covered them with snow; as some recommend, and lost every hive. In the fall I put my bees in the cellar. Now in regard to this matter of covering. For years I have used nothing but my thin $\frac{1}{8}$ inch honey board, and I do not want to know any other way. As for this matter of raising them up, it is one of the best things I ever adopted. Put under the hive a frame two inches high, then across the front is placed common mosquito netting one inch wide and the whole width of the front; this leaves a space under there, and I can raise my hives right up and clean them out when I please. Now in regard to watering bees. I want to give my bees water in the spring just as soon as they begin to stir about, they want water.

C. Thielmann: My bees used to get noisy in winter until of late years, I found that whenever they got noisy in the spring I would give them ice instead of water and they would quiet down and be all right, so I made up my mind that it was the thirst that made them noisy.

Mr. Mendenhall: I put my bees in the cellar four or five tiers high, but the whole front of the hive is open and I go down with a lantern every two or three days, and if I see any dead bees I take a stick and poke them all out. I hardly ever see any dead bees. I have it plastered overhead and on the side. The last two winters I have not lost a hive of bees.

Mr. Holmberg: I take off the cover and I have always had success in wintering bees. When the bees become noisy in the spring I give them ice, because we could not get any snow. I have always wintered them with great success.

M. Cutler: In regard to the time of putting bees in the cellar. What time do you do that? I put mine in the cellar this fall the first cold snap.

Mr. Holmberg: When the warm weather is over and a cold spell comes, about the 20th of November. Last year I had some colonies out all winter and they came out the best of all; I have some colonies out now. and last Sunday they were out just as in the summer time.

Pres. Wilcox: As to the proper time to put them in, I was forcibly struck last winter with the remark of Prof. McLean: "Always put them in a little too early and take them out a little too late."

Mr. Doudna: I would like to give you a little experience I had two years ago. I did not have room enough in the house cellar, so I put fifty-seven colonies in a hole in the ground, covered them over with a foot of dirt, made an air space, and put another foot of dirt over them. About that time we got a severe rain that soaked everthing. I then put on two tons of straw on top. They staid in there all winter, and in the spring I dug them out and took every hive out in the best condition I ever took bees out in the spring in my life, but such moldy combs I never saw.

Mr. Pond, of Bloomington, then read a paper on the production of extracted honey.

THE PRODUCTION OF EXTRACTED HONEY.

BY E. R. POND, BLOOMINGTON.

The apiary should be sheltered on the north and west. The hive used should have a large frame and be made so that it can be tiered up to an indefinite height. The first thing necessary is to get the hives filled with bees. If they are weak when first set out in the spring and short of stores, feed syrup in small quantities and often. This will cause them to increase rapidly. As soon as they begin to store honey more than they need for immediate use, or about the time white clover begins to blossom, it is time to put on the second story. I use a zinc queen excluder above the brood nest. If they do not commence working above readily take one of the frames from below containing brood, see that the queen is not on it, put an empty comb in its place, then put the one with brood above; this will certainly start them at work above, if there is any honey coming in.

Without the queen excluder in working for extracted honey, in nine cases out of ten the queen will go above, and in the fall when the time comes to take off the upper story the bees and all the honey will have to be moved below. When the frames in the upper story are well filled either extract or raise up this story, putting another one under, making a three story hive.

The honey to be of the best flavor should be well ripened. A good many claim it is better flavored when ripened on the hive, others think it is just as good when evaporated in the sun, or over a slow fire.

When you are ready to extract, you need a comb bucket or something to carry the combs in. I use a box, carrying it on a spring wheelbarrow. Fill the box with empty combs, and as you take out the full frames put in the empty ones in their place, this saves time. When through take the full frames to the honey house. Here you need a sharp knife to shave off the cappings.

Some complain that the honey that drains from the cappings tastes of the smoke, but if so, I think they must smoke the bees unnecessarily.

There are several different styles of extractors, each one claiming some particular advantage over the others, but any one is good.

As the honey is extracted it should be run through a strainer, and if well ripened can at once be put into barrels or cans if you intend to ship to market. I think a better way is to take the time through the fall and winter and drive through the neighboring villages and work up a trade.

If one deals honestly he will gradually get a large custom, and will do better than in sending it away to be sold on commission.

In extracting care should be taken to keep the different grades separate and it will bring a better price.

When the honey season closes the hives should be examined, and if any are short of stores they should be fed so as to have about twenty-five pounds of honey to take them through till next season. In our cold climate it is safer to winter in a cellar where the temperature can be kept at about forty degrees above zero.

DISCUSSION.

Mr. Danforth: I cannot let this subject pass without speaking somewhat upon it. I like bees very well, but yet for the fun of keeping them, I would not do it. I keep bees for what money there is in them. I like extracting, because I can secure the largest result in that way, and I am certain of a crop.

Pres. Wilcox: Do I understand that you extract exclusively?

Wm. Danforth: Principally.

Wm. Urié: Now I want to say a word about selling your honey. Grade your honey, first, second and third grade. Let the man you sell to understand that, and then place a reasonable price upon that honey. I know of honey that was sold here in large quantities at eight cents per pound.

Mr. Mendenhall: I will say that from my young swarms I do not get any extracted honey, but I extract my honey from the old swarms, and I get more pounds of comb honey than I do extracted. Of last year's comb honey, I did not sell any less than fifteen cents per pound, and extracted from twelve to thirteen and fourteen.

A visitor: I would like to ask how we can sell our comb honey for 12½ to 15 cents per pound, when California honey is shipped in here and sold at 6 cents?

Wm. Urié: California honey is an inferior honey; it will not bring more than one-half as much in any market as other honey will. I have tested it. I was obliged to take 2,500 lbs. on a note two years ago from a man from California who got stranded here, and I could not get enough out of it to get him to California.

Pres. Wilcox: Perhaps it would be an excellent idea to bring

out in this discussion the fact, which I believe to be a fact, that nowhere can they produce a superior honey to Minnesota honey.

Wm. Uriel: I will except Vermont.

Pres. Wilcox: I came from Vermont, and they have nothing to compare with it.

Mr. Haskin: I have produced honey in California, Florida and Tennessee and other states, but I have never tasted any honey that is as good as Minnesota honey.

A visitor: I got some honey from California and sold it to my customers and they were well satisfied with it. I would not sell them the Minnesota honey that is found in our commission houses.

Wm. Uriel: There is not a pound of Minnesota honey in the Minneapolis market this winter. It is all shipped in and then sold under the name of Minnesota honey.

Pres. Wilcox: I want to correct friend Uriel in one respect. I ran across brother Murray's honey in a commission house in Minneapolis one day, and if there is any better honey on the face of the earth I would like to see it.

J. P. West: I supposed it was generally known that the further north honey is produced the better it is. Canada claims to produce the best honey in the world. I travel all over the state and have been in other states, and whenever I have a little time I go into the stores and examine the honey, and I never have seen any that equals our Minnesota honey.

Mr. Ford: I was in the bee business a number of years back. A man that is in the fruit business here wants to raise bees. I visited a friend of mine some time ago and he invited me to take dinner with him. He had just got a can of honey, and when he opened it I asked him where he got that honey. He said "That is California honey No. 1." I did not like the honey at all. I think it was the poorest honey I ever ate in my life.

Mr. Cutler read the following paper, by G. S. Auringer:

HOW I MANAGE MY APIARY.

BY G. S. AURINGER, OF BONNIWELL'S MILL.

Ladies and Gentlemen: I have been invited to prepare a paper, giving my method of the management of my apiary.

I have no regular system. Most of my hives are the old style Heddon. I strive to keep my bees from swarming until about the fifteenth of June, by taking brood from the strong colonies, and giving to the weak ones. I keep down increase by putting the old hive from which the first swarms issue, on top of a weak one, when the bees of the weak one will destroy the queen cells, and thus make a strong colony. The new swarms should be placed on the stand from which the old one is taken. I keep the

queen's wings clipped. To clip the queen's wings, I find the comb she is on and hang it in an empty hive, then pick up one wing and draw my knife across it, where it lays on my thumb or finger, letting her cling to the comb. I do not think I ever lost a queen by clipping her wings.

I use foundation starters in the sections, and put the cases on as soon as I think the bees will enter them readily. When they swarm I take the section cases off and put them on the hive of the new swarm. If I put the old colony in a new place, I cut out the queen cells on the eighth day, if I am sure a young queen has hatched. When the first case is nearly full I raise it and put a new one underneath. When the main honey flow is over I take the sections off and sort them, and put the partly filled ones in a case, and set it on a hive containing a strong colony, and try to get them all filled and finished. Next comes wintering. I want each colony to have enough good honey to winter on. I never feed anything but sealed honey. I pack a surplus case full of dry leaves and put it on top of each hive, and put them in a dry cellar with a temperature of forty to forty-five degrees above zero, and have been lucky enough not to lose a single colony in wintering yet, but expect to this winter as I have thirty-two colonies in a cave, and they seem pretty damp.

I am a poor hand with a pen, so you must excuse all mistakes of an old farmer, but a young bee-keeper.

The meeting then adjourned until 7 o'clock P M.

EVENING SESSION.

The following paper was read by the president:

HONEY PLANTS.

BY A. N. WILCOX, OF HASTINGS.

As a rule we may class as honey plants all those whose flowers originally require the presence of foreign pollen to develop perfect seed formation; for in these flowers nature deposits a small drop of nectar to attract the attention of insects to them, which bring the pollen of other flowers of kindred species to produce the cross fertilization required. Many of these like the clovers and asters, strictly speaking, are a bunch of separate flowers each producing its seed independent of each other, and so furnish nectar for a long period of time, or until the last division has been pollinized; for it is a well established fact that the secretion of nectar will cease, when there is no further necessity to the flower for its presence.

The most prolific honey producing flowers in Minnesota, are the clover, basswood, and the asters of our river bottoms; and all these owing to our pure and invigorating atmosphere, which give to the plants a healthy, vigorous growth, secrete a large amount of nectar of excellent quality. Where these all are within reach of the apiary they furnish it with an almost continuous flow of honey; besides the late flow of honey stimulates late brood rearing, giving an abundance of young bees, which is an important requirement for successful wintering.

The aster grows on our low lands and river bottoms to a height of five or six feet, bearing on its top and on the ends of its branches a large com-

pact bunch of purple blossoms; they are usually so filled with honey that the bees will neglect buckwheat, and other fall flowers, while they are in blossom.

The president then read a letter from Prof. McLean saying on the account of sickness he would not be able to be with the association. The members were very much disappointed in his not being able to address the meeting, according to the program.

QUESTION BOX.

Question. "How does beekeeping compare with other pursuits upon which to depend for a living?"

Wm. Danforth: I did not think of speaking on this subject, and I am very poorly prepared. I can think way back a good many years ago of those that I knew then who then got their living entirely from the apiary. I do not know that I can recollect anybody that got enormously rich out of the business, but I can think of those that got a comfortable living and made a good business out of raising honey and would depend entirely upon the bee for their living.

I do not know how we would succeed in this country, but still I do know that in my own experience I have made some years a great deal of money out of bees, not anything like a great amount, but some years I have made from five to six hundred dollars out of my honey from fifty to sixty colonies of bees. I do not know of anything that pays a greater percentage on the outlay than the bees and the honey I get year after year from my apiary. Now looking back to this past year it seems to me we got a very small crop of honey, but with my own crop I got something over thirty pounds, and when you reckon that up at sixteen cents per pound it makes \$4.80 per hive. I was selling my hives in the spring for six and seven dollars per hive. Now I have not got anything on my place that has paid me better than my apiary. Of course, I put in some time, but I think it has paid me well even with a small crop of honey, and I do not know of any business I would follow sooner for the money there is in it than the bee business. I am satisfied that I or any other man can take care of about two hundred colonies, and last year I received over ten dollars per colony, and I do not know of anything that I had upon my place that paid better than the bees, and I think if I should devote my whole time to the bee business I could make as much money as I could off my

farm. I think I got nearly one hundred pounds of honey on an average, excepting this year, of comb honey. I am favorably situated where our bottom lands are about three miles wide. I do not know that it would average quite as much as that, but I am certain that over sixty pounds has been the usual average.

Pres. Wilcox: As I said, for a good many years I averaged about eighty pounds of comb honey, and I should call the average this year, in our neighborhood, about one-third.

C. Thielmann: This year I did not come out even. I have kept bees for twenty-one years, and I always managed to make my bees pay me about as well as anything else. For the last nine or ten years they have paid me better than anything else, even if I take this year's failure in with it. I think my bees have averaged me about one thousand dollars a year for the last ten years, and I have done the work pretty much alone. I have now 220 colonies. My average number for ten years has been about 140 to 150 spring colonies. I never had a great many over 140 or 145 until this last spring. My business is farming, but my farm is not an extra piece of land, it is hilly and rough, but we have land enough, about 200 or 250 acres, and all the land, the house, barns, horses and other stock and all the money invested is more than five or six times, yes, ten times the value of the bees, yet the bees for the last four or five years have paid a good deal more clear money than the whole farm.

M. Cutler: Mr. President, I am a green hand in the bee business, commencing a year ago last spring, but I would not recommend any new beginner to go into the bee business and follow that as an occupation alone. As a rule our apiarists who are succeeding at the present time are those who have had a good many years experience, and many of them are doing something else in connection with the business, and even the most successful ones are selling supplies and making supplies in connection with it. I have not heard of that man who has commenced and been successful right along. There is generally about as much luck as skill about it, and according to my observation I believe that nine-tenths of those that commence keeping bees fail. Of course it is merely due to not understanding the nature of the bees and keeping them up in good condition. I know of a man out in our county who had thirty to forty colonies two or three years ago that have been cut down to ten or twelve poor, weak colonies, some of the hives filled with moths, and comb that is nearly destroyed, and those

disgusted bees when they swarm go to the tops of the highest trees on the premises, and it comes right in the busy season during haying and they allow them to go to the woods.

C. Thielmann: I would like to ask if those men who make nothing on bees are good for anything else? (Laughter.)

Pres. Wilcox: Is it not a fact that those men who have so many irons in the fire make a failure in the business?

Mr. Ford: Our president says we do not want too many irons in the fire. A man who goes into the bee business must attend to that business, and it is so in any other business.

Mr. Doudna: So far as I am personally concerned I would rather have the profits from my bees than the best one hundred acres of wheat in Douglas county.

Question "Is stimulative feeding in spring desirable?"

Pres. Wilcox: I will call upon Mr. Uriel to answer that question.

Wm. Uriel: I was in hopes you would call upon some one else. I will try, however, to make a few remarks upon that point. I can say that stimulative feeding in spring is a success if properly done. My method I have used in my experience of a great many years is to feed in troughs during the day, and if that is properly done by an experienced hand there is no danger. They come out every pleasant day, and I take honey and thin it down pretty thin, say two-thirds water, and I put into the troughs from one to two pails full and let the bees come out and carry it back to the hives, and you will find if you fill that in the morning about nine o'clock that they will come out and carry it back in the hives, and there is no fighting in the hives; but perhaps a new beginner had better not attempt it. Do not commence feeding until nearly May. My advice would be about the first of May, then feed a little every day, and you certainly will have a stronger swarm the first of June.

C. Thielmann: My experience in that line is just the reverse of Mr. Uriel's. The quieter and warmer I can keep my bees in spring the better I succeed in getting large swarms when I want them. All bees, if they have it in their hives, place their food just where they want it exactly, and I always prepare my bees in the fall so they will have enough to last them till warm weather comes, and there is no danger of killing the brood. It seems to me with this stimulating feeding they overdo the breeding part, and they have more brood than they can take care of, and the consequence is that when a spell of bad weather comes the young bees in the cells will die. I used to feed my

bees and stimulate them, but from experience I have had I will never do it again.

James Taylor: Two years ago, before the great honey crop, I took my honey and I fed it to the bees and by the time that white honey crop began I had my bottom full of bees and it was a grand success. It paid, and I took advantage of it that fall and saved over three thousand pounds of that same honey, and when the next spring came I pursued the same tactics, and I used to lie down at night and rejoice at the great success I was going to have, but the bees consumed all the honey they wanted, the honey did not come, and I wept. (Laughter.) So it just depends, it just depends, if, if, if, if, if—

J. P. West: I do not believe where one has a large number of colonies in the spring and they are in good condition it will pay to feed them, but where they are weak it may do, provided they are kept warm and are so fixed up and protected, that it will be impossible for the brood to get chilled; otherwise it will be a failure.

Mr. Doudna: Give me plenty of honey in the hive to keep them over the season until warm weather comes and the queen will supply the eggs as fast as they need them.

C. Thielmann: About this feeding question, there is certainly a great difference in localities. I have never had any occasion to feed my bees, as they always have enough and more than enough, and get much more than I would like to have them.

Mr. Mendenhall: Last spring I fed a swarm on bread and milk and they liked it pretty well.

Pres. Wilcox: Perhaps I should say I believe heartily in spring feeding, and I practice it.

Question. "Is it best to prevent increase or control it?"

B. Taylor: Control it.

Pres. Wilcox: I take it the meaning of the question is whether it is best to prevent increase or allow them to increase promiscuously.

C. Thielmann: The increase can never really be prevented.

Wm. Danforth: This question of controlling the swarming is a very important one to my mind, and I have made up my mind to this, that I will keep back the swarming in the spring of the year as much as I can, that is, make them swarm as late as possible, by drawing from the stronger ones and building up the weaker ones, which I think works well, and if we can succeed in keeping them from swarming until pretty well towards the 4th of July, I consider myself pretty well off.

Pres. Wilcox: I will say this: I have at present something over 150 colonies. I do not feel able to go into any argument or discussion over this matter to-night, but I will state a fact, and that is that I have had but one swarm from which I did not control the increase for three years, and if any of you will take the pains to visit my apiary during swarming season, if I do not prove to you that I control the increase I will give you every swarm.

Question. "Is it practicable to catch the entire swarm on leaving the hive in swarming?"

J. W. Murray: I do not catch the swarm at all; I catch the queens and control the swarm.

Mr. Doudna: I go for the queens, and when I see a swarm come out, without getting excited, (I do not believe I get as nervous as friend Taylor anyway) I take the queen up quietly, and I once put three swarms into a hive like Mr. Taylor. I got over two hundred pounds of comb honey from those three swarms.

Question. "Is 50 degrees of heat too warm for wintering?"

James Taylor: It is too warm.

C. Thielmann: It is pretty well settled that from 40 to 45 degrees is too warm, but I believe we had some men, such as Barber, who had it up to 90, and his bees came out all right. I had a little experience when I had that sawdust house. In fact, it got quite warm. We had a spell of close warm weather and I happened to be away for three days, and I got uneasy before I got home; I thought of the bees and knew it was getting too warm for them. When I got home the first thing I did I went to the bee house and I heard the bees roar before I was within three rods. I opened the door and all the bees came right out just as thick as the door would hold them. I shut it very quickly; I did not want them all out, went and got a light and stepped in as quickly as I could, and there were the bees all out on the hives and on the wall, and the whole thing was just one mass of bees. There were about 130 colonies in the house, and the house was 16x24. I dared not open the door because they would all go out, so I opened up the ventilators. There were thousands of bees over the whole house that hung there and died, and the floor was covered an inch deep with dead bees. So I know that 62 degrees is far too hot for bees in winter.

Pres. Wilcox: Gentlemen we have discussed this matter far enough, and we are all anxious to listen to an address from our new president. I have the pleasure of introducing to you Mr. West.

Mr. West then addressed the association as follows:

Mr. President and Fellow Bee-Keepers:

Our constitution does not provide that the new president shall make an address in assuming the duties of his office, but it does provide that the president retiring shall, which I think he should do.

In assuming the responsible position to which you have elected me, I wish to thank you for the honor conferred. I realize the importance of the position, for my whole heart is in this work. I am here for the reason that I wish to see this society prosper, and I am willing to do everything I can in that direction.

I do not set myself up as an expert in agriculture, neither do I assume that I can teach you in the mysteries of bee-keeping. I commenced to keep bees in 1878, in the south part of the state where there was neither clover or timber. I was successful, and consider that I know something about bees. Having accepted the duties of deputy public examiner for the state I was compelled to dispose of my bees, and have not had any for the last three years, but I have made up my mind to start an apiary, and have always been sorry that I disposed of all my bees.

Now so far as this society is concerned I will do all I can to make it prosper.

I believe that in a few years this society will be one of the most important in the state of Minnesota, and I ask you to give me all the assistance you can to make it such. (Applause.)

Pres. Wilcox: I am satisfied that our friend West is peculiarly well situated to build up this society. The duties of his office require him to visit every county in the state. It will give him excellent facilities for building up the interests of this society, and from my acquaintance with him I know he is just as much of a bee "crank" as the rest of us, and I look forward to the grand prospects that are open to this society, and all we need is the co-operation of its members. If every member of this society makes himself a committee of one to secure other members in his own neighborhood we cannot help but have good results. I feel very much gratified to see the large and

intelligent audience here today, and I look upon it as the harbinger of our future prosperity.

Before we adjourn I think we as a society should extend our thanks to the Horticultural Society for its courtesy, and to the owners of this building for their liberality in furnishing us these rooms free of charge.

On motion it was unanimously voted that the hearty thanks of the members of the Minnesota Bee-Keeping Association are extended to the Horticultural Society for their courtesy and kindness in arranging for our meeting here, and to the Guaranty Loan & Building Co., for the use of this building.

It was also voted that the executive committee fix the date and place of our next annual meeting and notify the members of the same.

Adjourned *sine die*.

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